

PC & TECH AUTHORITY

TECH ADVICE YOU CAN TRUST

INTEL'S BEASTLY
BROADWELL
5TH-GEN CORE CPUs FOR
DESKTOP AND MOBILE



BUYER'S GUIDE
SMART WATCHES
Stumbles and successes
as a new technology evolves



- MICROSOFT RE-EMBRACES THE DESKTOP
- OUR EXPERTS LOVE IT AND EXPLAIN WHY
- THE PC IS BACK, BABY!

WINDOWS 10

THE BIG REVEAL

Sorry about
Windows 8!



REVIEWS

27-INCH IMAC 5K RETINA, ASUS TRANSFORMER T100TA, IPAD AIR 2, ACER ASPIRE NITRO V, LG CURVED ULTRAWIDE, SANDISK ULTRA II SSD AND MORE



HOW TO:

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ADAPT. CHANGE. GROW.

PC & Tech Authority puts on a shiny new pair of boots.

A bit of a spruce-up is evident in the pages that follow, which I'm sure you've noticed in your initial flick-through. We think it looks pretty slick, without being too drastic an overhaul. We've chosen new fonts, which we think not only give the pages a long-overdue refresh, but also make the magazine easier to read, and for those insanely long product names to look a bit better. Shifting away from all upper case in the product name titles means we can avoid situations where the HP ProOne became the 'HP PROONE'. Oh dear.

Designer Tim Frawley has done good work with the look and feel in general, ditching things like the grid paper theme, and that horrid baby blue background in some areas that has long worn out its welcome. Our new look is fresher and easier on the eyes, without falling prey to the whims of over-stylised design trends.

Beyond the pretties comes some enhanced change to our content, which I hope you like. We've paid most attention to the back section of the magazine, but not messing too much with the outstanding long-form editorial written by legendary experts who deserve, and I believe, earned, your trust. Many of our writers explore several topics in their designated area, including relating tales of those insightful real-world experiences that we learn so much from.

Part of this tweaking involved giving more space to our most well regarded writers, and with that, paring back our core of writers to the very best, in conjunction with giving them a great deal more leeway to cover what's on their minds and they go about their professional IT lives.

Leading into the back section is a new part of the magazine, which I think was absolutely necessary to include. 'Futures', so named because it looks ahead, will

examine existing technologies as we see them evolving, as well as emerging tech and gear. It's all very much grounded in reality, and leverages the wisdom that comes with many decades of being in the middle of it all by our writers. Futures isn't a bit of 'crystal ball' fluff. It's not so much speculation, but visionary extrapolation. I think you'll quickly make this one of your favourites; it's already one of mine.

Coincidentally, in this month of change, our Investigator Ros Page has decided to move on, and after many long years of stellar work as your consumer watchdog she leaves with our thanks and gratitude. Taking on the Investigator challenge from next month is well regarded technology journalist Anthony Caruana. If you want to raise an issue, whether one that's hit you personally, or one that needs examination in general, please email Anthony via investigator@pcandtechauthority.com.au. While we can't promise that we can help with every case, we'll do our best, and at a minimum if several readers are experiencing the same issues we'll take that on as a theme for Investigator in a given month.

The journey never ends, and next month we'll hopefully have even more good news to share with you about how *PC & Tech Authority* will continue to earn your support. Until then...

MERRY CHRISTMAS EVERYONE!



Ben Mansill

Editor

bmansill@nextmedia.com.au

Get exclusive content with the *PC&TA* iPad app

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- Our tests are performed by experienced reviewers in our Labs in accordance with strict benchtesting procedures
- Our brand new benchmarks have been tailor-made to reflect real-world computing needs
- We put tech through its paces – seriously. From processing power to battery life, from usability to screen brightness, our tests are exhaustive
- We will always offer an honest and unbiased opinion for every review

THE TEAM...



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Vale, Prey 2 - we barely knew ye.



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"That's right, yes, components are the things that go in a PC..." Jo explaining to someone who should know better.



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Tim Frawley

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Ben made me put Clippy on the cover, I really didn't want to...he also wanted to use Comic Sans...I had to draw the line there.

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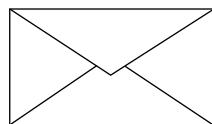
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INBOX

Readers write

LETTER OF THE MONTH

SYSTEM REVIEWS

In regards to your new Upgrade Australia section. I was just wondering if PC & TA was going to show readers different desktop systems that may suit both gamers, enthusiasts and cover just plain machines that get the job reasonably well? In last month's review there were a lot of processors and an SSD mentioned.

Also over the last 4-5 issues much has been shown on PC desktop components but none on what a machine carrying a lot of these components can actually do. Would you be able to put all the information on hardware into several different types of machines to show what consumers can get for their dollar?

It seems so much reviewing of tablets / smartphones etc is done these days but little ever covers the old PC form. I realise in part this is done in the Kitlog but it is from one extreme to the other and not applied to the type of use and budget. Grouping these in prices ranging from \$1000-\$1500 and \$2500+ I feel would be of great benefit to many readers, allowing readers to look at both the pluses and minuses of each manufacturer and their systems.

Jason Robards

Ben Mansill replies:

Thanks for your letter, Jason, we do appreciate your thoughts and ideas. I agree, full system reviews certainly have a place in PC & Tech Authority, and the benefits of doing this are clear. For most of this year we did include two broadly representative systems in A-List, but they were extremes. One very high-end box, one 'media' PC. And not a whole lot of middle ground.

The main reason we don't do systems reviews is that there are a great many vendors who are selling fantastic PCs, and within their range, many variations

based around custom components that buyer's can tailor to their costs and needs. Furthermore, these PCs generally have a very short 'shelf life', with just a couple of months passing before the vendor tweaks the configuration.

That's the main reason why we don't get these systems in for review. It's compounded by the number of vendors, so if we do one or two, strictly speaking and to be fair, we'd need to cover many more.

But you are quite correct, a better spread of 'representative' systems that are actually built and benchmarked, as opposed mere hypothetical 'builds' is lacking in these pages, and we will certainly address that in the new year!

COMPRESSION BITS

I feel I must cross swords with Dan Rutter (IO PC&TA Dec '14) re Vivaldi =Van Halen. It seems to me he is confusing compression with audio normalisation. Compression makes the soft bits the same loudness as the loud bits, whereas B. Edwin was asking about equalising the volume of the tracks. Yes compression may do a similar thing, but audio wise it is not the correct way to do it. Love the mag!

Hilton Mack

IMPERFECTION

Seriously, when was the last time a big multi-player game was released stable? Articles report how bad things are release, I want to know when they are released in a good condition because it is rare.

FourEyedGeek on Assassin's Creed: Unity Bugs

LINUX WAR CRY

If Ubuntu can get their mobile version working on PCs they could get a huge march on Apple and Windows. We should not just be able to create the mobile Apps on Macs/PCs but actually run them there.

Peterbreis on Ubuntu

Want to get in touch?

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WEB: pcandtechauthority.com.au

EMAIL: inbox@pcandtechauthority.com.au
Please limit letters to 200 words, where possible. Letters may be edited for style and to a more suitable length.



ILLUMINATED

I have both a Lumia 925 and 930 and to be entirely honest Microsoft is losing the plot. If they continue with this low/mid end range crap they will lose a lot of people. I just came from the Windows Central forum and its sounding pretty negative.

Boxa72 on Microsoft Lumia specs

U AM I

Wii U is a different beast. It is my favourite new system. Instead of high specs like PS4 it defines itself with games and innovation. Playing older games is definitely great on a Nintendo system instead of an emulator on PC. The community on Miiverse for each game is awesome. Plus... I want to support the company that made the older games. I know Nintendo is rich beyond rich, but they deserve to be paid for their long history of awesome games. 5-7 bucks a pop is not a lot of money.

8bitLink on what makes the Wii U special

HATE GROUPS

I can't believe gamergate "is even a thing". It just looks like the biggest troll feeding frenzy ever. More and more people are getting sucked in and there's so much chum in the water they're snapping at anything that comes near. After one dox'ed Felicia Day I figure it's not long before they start attacking each other.

Abo on GamerGate.

ROCCAT WINNERS

This month's comment of the month will receive a Roccat Tyon mouse, worth \$169!

www.roccat.org



WANT TO READ MORE?

Go to www.pcandtechauthority.com.au and join in the conversation. Also check out the Atomic forums: <http://forums.atomicmpc.com.au>

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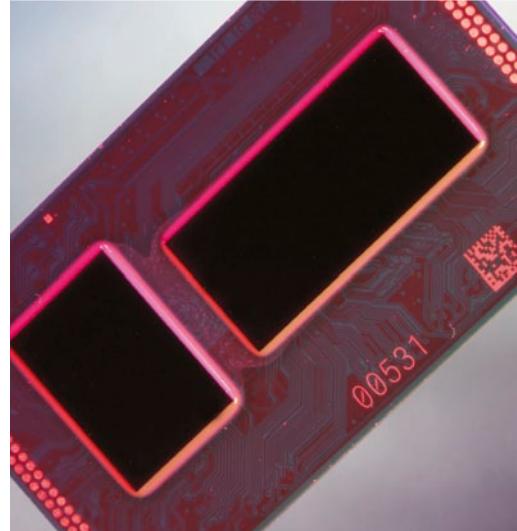


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TECH NEWS

The latest trends and products in the world of technology

MICROSOFT OFFICE IS NOW FREE FOR IOS AND ANDROID

Microsoft continues free cloud services push with Office apps for iPad, iPhone and Android tablets

Microsoft has made Office available as a completely free download for iPad, iPhone and Android tablets.

The company released Office for iPad in March but, while the apps could be downloaded free, you could only view existing documents and copy and paste content, unless you had an Office 365 subscription.

With this update, iPhone and iPad users can now create new Excel, Word or PowerPoint documents on their mobile device. Android functionality will soon be available too.

The new apps are still somewhat restricted with regards to the features they offer. Office 365 subscribers get unlimited OneDrive storage, Dropbox integration, which was announced earlier this week, and collaboration tools, which users of the free apps don't.

Business features like pivot tables in Excel and presenter mode in PowerPoint are only available for Office 365 Business subscribers. These users also get more options around custom colour and design.

In addition to the new mobile apps, Microsoft also announced some touch-optimised Office apps for Windows 10 are in the works, although the company didn't provide any further information.

Android users can sign up for the Office for Android preview now. In order to do so you will need a tablet with a 7-10.in display running Android KitKat. Lollipop tablets won't be accepted as the roll out will be gradual, so it may take some time to reach your device.able to exploit the bug. "Typically, attackers use remote code execution to install malware, which may have any number of malicious actions, such as keylogging, screen-grabbing and remote access," he writes.

However, he concedes that IBM "hasn't found any evidence of exploitation of this particular bug," before adding that "it is a only matter of time before we see them in the wild".

Freeman says the exploit would have commanded a six-figure sum if it had been sold before being patched. The bug has been rated 9.3 out of 10 on the Common Vulnerability Scoring System (CVSS).

INTEL'S PC DIVISION TAKES IN LOSS-MAKING MOBILE GROUP

Chip maker Intel merges failing mobile team with PC processor division

Intel is merging its loss-making mobile division with its hugely successful PC group, in a bid to revive its fortunes in smartphones and tablets.

In an internal email announcing the reorganisation, CEO Brian Krzanich told his staff that “the market continues to evolve rapidly, and we must change even faster to stay ahead”.

In reality, Intel's mobile division isn't so much staying ahead, as lagging miles behind. Intel's latest quarterly results show the company's PC Client Group posting profits of \$US4.1 billion, whilst the Mobile and Communications Group lost more than \$US1 billion. The Mobile group has lost more than \$US3 billion already this year.

Intel has struggled to make any headway

ADOBE'S OPEN SOURCE EDITOR BRACKETS OUT OF BETA

It seems to have been around for a very long time, but Brackets, Adobe's open source text editor, has finally hit version 1.0.

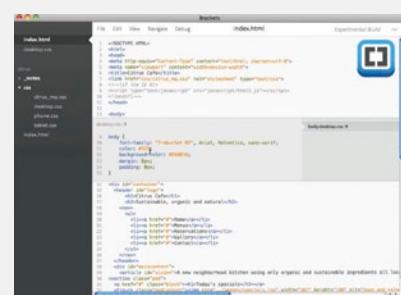
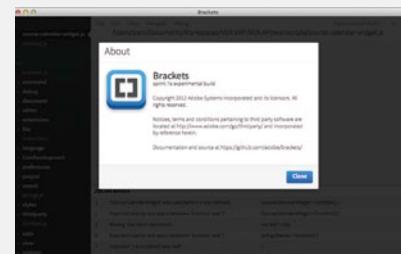
Brackets' appealing set of visual tools and inline editors now optionally comes with Extracts for Brackets (Preview), an extension which reads colours, fonts, gradients and other data from a PSD, making everything easily available within a clean CSS.

There's support for customisable keyboard shortcuts, and a wiki example (<https://github.com/adobe/brackets/wiki/User-Key-Bindings>) explains how these can be reassigned to match Sublime Text.

Quick Edit results are now grouped by file and collapsible, making it easier to view only the files you'd like to edit.

There are also reportedly “many performance improvements” over version 0.44 of Brackets.

It's a big step forward for Brackets, but the official blog post announcing the release says it's being treated just like any other. Development is going to continue at the same pace as before, and that means we're likely to see another release by around the end of this month.



MICROSOFT FIXES 19-YEAR-OLD WINDOWS BUG

Microsoft patches a critical bug that's been laying dormant in Windows for two decades - but is Windows XP still vulnerable?

Microsoft has patched a critical bug that has been present in every version of Windows since Windows 95.

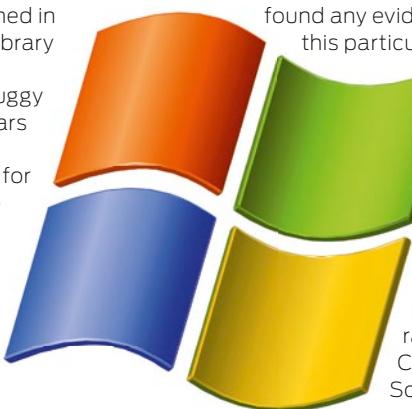
The bug was discovered by IBM researchers in May and was patched in this week's Patch Tuesday run, but with Windows XP no longer receiving security updates, the critical bug could still exist in what remains the world's second most used version of Windows.

The flaw could allow attackers to run code remotely on affected systems. "The bug can be used by an attacker for drive-by attacks to reliably run code remotely and take over the user's machine – even sidestepping the Enhanced Protected Mode (EPM) sandbox in IE 11 as well as the highly regarded Enhanced Mitigation Experience Toolkit (EMET) anti-exploitation tool Microsoft offers for free," writes researcher Robert Freeman, on the IBM Security Intelligence blog.

Freeman says the flaw has been "sitting in plain sight for a long time despite many other bugs being discovered and patched in the same Windows library (OleAut32)".

"In this case, the buggy code is at least 19 years old and has been remotely exploitable for the past 18 years," he adds. "Looking at the original release code of Windows 95, the problem is present."

The only Microsoft security bulletin dealing



However, he concedes that IBM "hasn't found any evidence of exploitation of this particular bug," before adding that "it is only a matter of time before we see them in the wild".

Freeman says the exploit would have commanded a six-figure sum if it had been sold before being patched. The bug is rated 9.3 out of 10 on the Common Vulnerability Scoring System (CVSS).

with an OLE flaw in this month's Patch Tuesday round-up says the patch has been applied to all currently supported versions of Windows, including Server 2003, 2008 and 2012, as well as Vista, Windows 7 and Windows 8.

Windows XP was, of course, not on the list, and Microsoft was unavailable to comment on whether the flaw still existed in that operating system at the time of publication. Organisations who have bought extended support for XP from Microsoft may well be covered, but millions of consumer PCs may now lie unprotected.

SPREADING MALWARE?

IBM's Freeman says there are many different ways in which attackers may be able to exploit the bug. "Typically, attackers use remote code execution to install malware, which may have any number of malicious actions, such as keylogging, screen-grabbing and remote access," he writes.

HOT... OR NOT

HOT

FAR CRY 4

It's just so beautiful. The Himalayas are stunningly rendered. You can almost smell the clean air and feel the cold. Mountain streams... bears frolicking in the grass... ah, yes, now here's a game that truly celebrates the beauty of nature.



NOT

FAR CRY 4

And yet... with glee we are expected to do terrible things to the poor bears, and be rewarded for it. Burn innocent villagers' homes and stick knives in people's faces. It was all great fun in the 90s when it was just big pixels. Now, it's all just a bit much.



A correction from last issue is in order. Our review of the Jabra Sport Pulse Wireless showed its price as \$189. This is not so! The correct price is actually \$249. Sorry Jabra!

NETFLIX OFFICIALLY ANNOUNCES AUSTRALIAN EXPANSION FOR MARCH 2015

We knew it was coming, but now we have a date for the content streaming service's Australian debut.

The media streaming service Netflix will be launching in Australia and New Zealand in March of next year.

However, what we'll be getting, and what we'll be paying for it, is still somewhat up in the air. The official press release promises a 'curated selection' of films and television, along with 4K content – which should be a real test of Australian internet capabilities. At

launch, Netflix ANZ will be available on smart TVs, tablets, smartphones, and computers and other internet connected devices such as game consoles.

Netflix content, which includes a vast library of movies, documentaries and TV episodes, will stream in HD, and for some content (and compatible devices) in UHD. Netflix-exclusive content will also feature.



GAMING NEWS

Are you game?

HP'S OMEN GAMING LAPTOP SETS ITS SIGHTS ON THE RAZER BLADE

It's not a beast, but then again, it doesn't look or cost like one either

Ever since announcing its company split, HP has shown renewed gusto. The 3D-modeling Sprout desktop is fascinating and new, but even a gaming laptop is fresh territory for the company.

But the just-announced HP Omen isn't a chunky, ultra-powered, everything-but-the-kitchen-sink kind of games-centric notebook. Instead, it's a clear attack on the Razer Blade, and it's similarly a slim, distinctive laptop tuned for gaming purposes – with the name and logo a reference to the former VoodooPC brand that HP bought and buried back when.

The Omen packs a 15.6in 1080p touch display, and is powered by a quad-core Intel Core i7 processor with an NVIDIA GeForce GTX 860M graphics card. With a thickness of 19.9mm and a weight of just 4.68lbs with a matte black aluminum chassis, it's designed to be actually portable for a gaming laptop.

All ports are located on the back to keep cords out of the way of any gaming accessories, and the customizable backlit keys let you set seven different zones of colours



for at-a-glance reactions. Even the Beats Audio speakers – HP's using that last bit of branding before the deal runs out – have multicolour lighting options, as well.

The HP Omen is available now in the United States at a starting price of \$2199 for the base model, which has the 2GB GDDR5 version of the NVIDIA GTX860M, along with 8GB DDR3 RAM and a 128GB SSD. No, it's not as well-stocked as the current Razer Blade, but it's also significantly cheaper for the base model.

Premium options are available to double or even quadruple the size of the SSD, as well as double the graphics memory and system memory, and HP will have a branded Omen mouse and backpack out this month, as well.

The popularity of gaming laptops is on the rise, in large part thanks to their utility as very powerful desktop replacements for travelling workers. This has been fuelled by slimmer and lighter machines, just like the Omen, which have seen wide acceptance over the traditionally hot and heavy gaming bricks of old.

GOAT SIMULATOR

BECOMES FANTASY MMO IN LATEST PATCH

Want to knock over villagers, knights, watch towers, with a horde of other goat simulating fans? Of course you do

I can only imagine the crew at Coffee Stain Studios are a little bemused.

They've made some solid games, but nothing has been quite the hit of Goat Simulator, a firmly tongue in cheek simulator of, well, goat shenanigans.

The game is immensely popular, selling over a million copies on PC, and 500,000 on mobile. So, for Patch 1.2. Coffee Stain wants to celebrate.

Goat Simulator is now an MMO. A fantasy MMO, complete with... goats.



GAMERS 4 CROYDON HONOURED IN LATEST LEFT 4 DEAD 2 UPDATE

A fitting thank you to the gamers who started Australia's R18 debate

Getting an R18 rating for games in Australia is one of those things that makes so much sense, it's easy to think it's always been there. But it took a lot of hard graft to get our lawmakers in train with how diverse games and their content can be, and a lot of that work started with Gamers 4 Croydon, a pair of South Australian gamers who took on then SA Attorney General Michael Atkinson.

Gamers 4 Croydon started the debate rolling, and not only are we as gamers thankful, but it seems that Valve's Gabe Newell is thankful as well.

Gamers 4 Croydon announced via their Facebook page last month that they had recently received an email from Newell, thanking them for their efforts, and which has lead to an uncut version of Left 4 Dead 2 finally being legally available in Australia.

And the attached image, which will go into the game this week, is how Valve and Newell are paying tribute. Here's what Newell told them:

"We really appreciate your work for the Australian gaming community. Please see the attached image. This will be going into the game next week. Pretty impressive what you were able to accomplish."

Thanks,
Gabe"



JOIN OVER
8 MILLION
PLAYERS WORLDWIDE

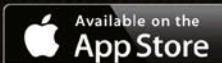


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WARGAMING.NET
LET'S BATTLE



WWW.WOTBLITZ.ASIA

CHIP NEWS

A VISCy nuclear situation sees IBM pay GlobalFoundries \$1.5B to take their fabs, and on the front foot, Nvidia is forcing AMD to Tonga, Fiji and Iceland in attempt to recover. Mark Williams covers the latest in chip news.

CPU

VISC

A startup firm, Soft Machines Inc., is touting the benefits of its new VISC (Virtual Instruction Set Computing) architecture design over traditional RISC (think ARM and PowerPC) and CISC concepts (think x86). Instead of having hardware cores and software threads like current CPU designs, VISC throws those out and makes it all virtual thanks to a "light-weight 'virtual software layer'" allowing for dynamic core resource allocation on the fly.

Have a hefty single threaded game? This can alter itself to act as a massive single core to get maximum speed and throughput (like a reverse hyper thread). Have a heavily threaded task? This could virtually split itself into potentially as many cores or threads as you need to best suit the task.

Soft Machines already has a 'dual virtual core' prototype SoC running and they are claiming a 2-4 fold increase in IPC! Considering Intel only gains about 10% IPC with each generation, this is big news.

Thankfully they're interested in licensing and co-developing this technology with other vendors, AMD and Samsung reportedly being among the early investors.

WANT SOME FABS AND \$1.5B? IGNORE THE NUKEs

With manufacturing profits waning thanks to old fabrication techniques and Power chip shipments dwindling, IBM has decided to step out of the fabrication business. So cut throat is the fabrication business it had to pay GlobalFoundries \$1.5B to entice them to take over control of its two facilities plus staff. The only thing IBM is keeping is the semiconductor R&D division.

The Common Platform alliance without IBM as a foundry partner leaves just GlobalFoundries and Samsung as the only partners left. And with GlobalFoundries outsourcing its 14nm tech from Samsung it appears Samsung is the stronger member of the alliance.

While GlobalFoundries is currently struggling to keep pace with TSMC and

Intel on process tech and volume, this deal also gives them ownership of thousands of IBM's patents giving them one of the largest portfolios in the world.

The deal is subject to as many as 200 regulators worldwide, the trickiest being in the US where IBM customers include the government and military, which among other things supply supercomputers that maintain their nuclear stockpile. GlobalFoundries being majority owned by a foreign government triggers a review of the deal by the White House.

▼ GlobalFoundries' Dresden plant.



GPU

AMD'S FUTURE GRAPHICS CARD LINE UP

The performance and efficiency of Nvidia's GTX 900 series is competitively giving AMD a hard time. AMD is taking some immediate action in the form of new R9 290X cards being paired with 8GB of memory, double the current size, and should arrive very soon in an attempt to stem the immediate threat and possibly tempt those looking at 4K or multi-screen setups.

AMD is also busy cooking up its next 300 series Radeon family. At the top of the list sits what will presumably be dubbed the R9 390X. Recent shipping manifests from AMD have confirmed that its next big chip has the codename Fiji XT. Not much else is known at this stage apart from a hybrid cooling solution being a contender as its stock cooling solution, so expect a raw performance at any cost style chip.

Tonga XT's launch has also been put on hold. It should have launched by now

but with Nvidia's fierce competition AMD has been forced to delay the launch to do further tweaking until Fiji XT is ready. Rumour is this will now launch alongside Fiji XT and be branded the 300 series mid-range product.

Then there's Iceland to cover the 300 series low end side of AMDs product stack. All these are expected to now release in late January 2015.

GTX 960 AND TITAN II

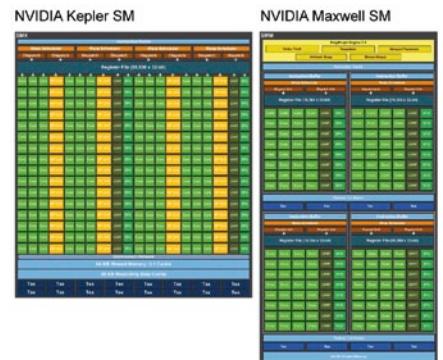
Nvidia is continuing to press their Maxwell advantage with specs having leaked for a GTX 960. No Cuda core count is given but a core speed of 993MHz is detailed. Other specs include a 4GB GDDR5 frame buffer at 6GHz sitting on a 256bit wide bus, and sports HDMI, Display Port and dual DVI connectors.

Not waiting for AMD to catch up there's also been leaks of a Titan II specs. These are from an anonymous source who submitted them to SiSoft's hardware database, so please take them with a

grain of salt. 3072 Cuda cores at 1100MHz in a 551mm² chip made on the 28nm process. 3MB L3 cache, and a likely 384-bit memory bus to support its massive 12GB of 6GHz clocked memory.

No dates are known for either yet but the GTX 960 will be sooner than later. Titan II might be held back until AMD's Fiji XT launch.

▼ The Maxwell core, compared to Kepler.





GRAPHITE SERIES

760T

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The stunning new Graphite Series™ 760T is the world's first performance PC case with panoramic windowed side panels that are hinged for easy access and secured with discreet, flush-mounted latches. Inside, there's room for multiple full-sized GPUs and the sophisticated cooling you'll need to build a truly state of the art system. Each drive mount is tool free and every drive cage is modular, so you can customize your 760T to fit your exact needs.

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MICE

Precision gaming tools that help you play your best ... whether it's professionally, or you're just playing to win.



HEADSETS

Accurate audio reproduction for compelling gaming and the situational awareness you need for a competitive edge.

MOST WANTED

Odd but cool gear

Dubs Acoustic Filters

The kids of today do love their live and loud music. Come to think of it, so did we, when we were 'today's crazy kids'. Pity then, that this new generation gets to enjoy the advances in rock and roll technology that we middle-agers missed out on.

Like these funny little plastic ear plugs. Designed for very loud concerts, and that can include a bit of cannoned 1812, Dubs Acoustic Filters are designed to filter specific frequencies, the goal being a perfect lump of living room-quality music entering your canals, free of the din, and crowd screaming, and all the rest of the buzz that infuses live music today. Get off my lawn.

www.getdubs.com



Flintu

A couple of clever Aussie innovators, Luke Trevitt and Evan Stuart, have put their clever idea to the Kickstarter test. We think it's a good one. They - operating under the company 'Plan V', have designed a very small adaptor, intended to hang off your keychain, that lets you use a regular 9 volt battery to charge your mobile device. Very clever.

Of course, 9 volt batteries can be found in a pretty much every supermarket, petrol station or convenience store in the land, so when your phone runs dry hopefully a 9 volt battery will be within range, and the Flintu's magic is that it adapts the battery's connector to a standard phone charging connector. They claim around 4 hours of talk time from a single battery. The Flintu is a tiny thing, and it sure beats carrying around a larger power pack for those rare times you'll actually need one. Goto <http://www.flantu.com/> and throw them a few Kickstarter dollars if you like the sound of this. The target price is around \$15 - \$20.

www.flantu.com



TomTom Golfer

There are two schools of thought regarding golf. One, that it's a top excuse for a walk in the sun, or rain, or indeed zipping about in a golf buggy, which we think is more fun than actually hitting the ball around. The second is that golf is a deadly serious test of skill, with a fair whack of mind games at play, too.

For those of us who sit astride both viewpoints, it's only right to turn to gadgets to make the hard part easy and the fun part cooler. If that's you, and you feel like throwing \$300 TomTom's way, you can nab the TomTom Golfer. The wrist-worn device uses GPS and its database of courses to tell you precisely how far off the mark you are, by how much your shots suck, and by how many points you're being slaughtered in the game.

www.tomtom.com

HP OMEN

*Smash your expectations
and your opponents*

As players, we are conditioned to expect certain standards of hardware in the PC gaming space. For instance, if you want to buy a gaming laptop, you better believe it's going to be bulky, cumbersome and not a particularly strong alternative for a gaming desktop.

Until now.

Embrace the next evolution of the gaming laptop with the HP Omen. The Omen is a gaming laptop that can viably replace your gaming desktop, all the while embracing the aesthetic realities of slim design built on the practicality of lightweight mobility. Bottom line: the HP Omen is sleek and won't make you feel as though you're caught in a

HP OMEN AT A GLANCE

- 4th gen Intel® Core™ i7-4710HQ Processor
- Microsoft Windows 8.1
- NVIDIA GeForce GTX 860M graphics with 2048MB DDR5
- 15.6-inch diagonal Radience Full HD Infinity LED-backlit IPS Display(1920 x 1080) touchscreen¹
- Up to 16GB 1600MHz DDR3L SDRAM
- Up to 512GB solid-state drive
- Per-game assignable profiles
- Definable dedicated gaming keys

perpetual 'weights day' whenever you take it on the road. At 20mm of thickness and weighing in at less than 2.28kg², this ultra-slim laptop is also deceptive in terms of what it's packing beneath the hood.

Naturally, the HP Omen is poised to make short work of the latest and greatest games with a beastly GeForce GTX 860M video card (available in

"Unleash your full gaming potential with the HP Omen"

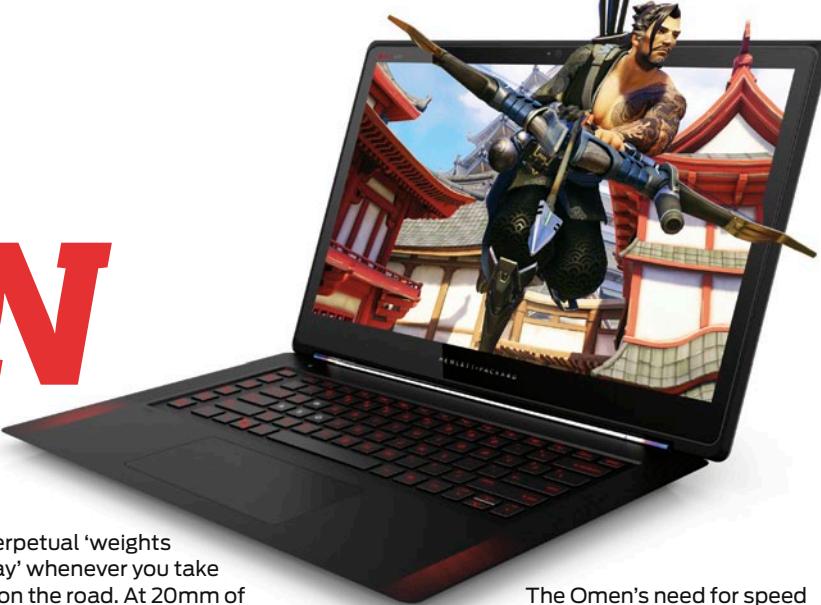
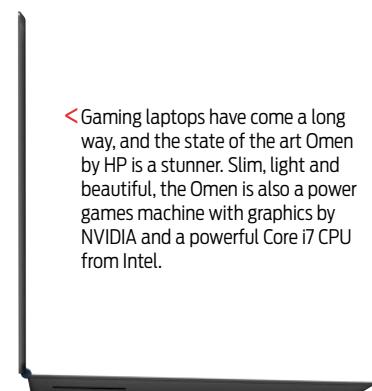
2046MB or 4096MB offerings), zippy 8GB of dual channel 1600MHz DDR3L SDRAM (also available with 16GB for extra multitasking prowess) and a powerful 4th gen Intel® Core™ i7-4710HQ Processor (2.5GHz, 6MB L3 Cache). All of this power is beautifully realised on a 15.6-inch Full HD WLED-backlit touchscreen display¹, so you can take full advantage of the navigation options of the preinstalled Windows 8.1 operating system, while simultaneously marvelling at gaming eye candy. Furthermore, the handy inclusion of HP Performance Advisor software assists with system tweaks, drawing every inch of power out of the Omen.

The Omen's need for speed doesn't end there, either. A 128GB SSD (also available in 256GB and 512GB options) hard drive complements the powerhouse performance with snappy loading times and blistering speed. Get into Windows and, more importantly, your Steam library faster with the HP Omen, which means less time looking at loading screens and more time fully immersed in the latest games. And while you're playing, take advantage of the logical inclusion of a gamer-centric keyboard.

Out of the gate, the backlit keyboard can be personalised to your tastes via the HP Omen Control application, which also boosts additional personalisation potential by allowing adjustments of fan speed, shortcut assignment and the creation of individual profiles. This latter point is of particular importance, given the six programmable keys within easy reach on the side of the keyboard that can be configured to your gaming tastes for a variety of macro functions. If you want to go loud, the Omen ships with the renowned aural prowess of inbuilt dual Beats Audio™ speakers, while a headphone-out/microphone-in combo jack and four SuperSpeed USB 3.0 ports (with USB boost support) are on hand for headset functionality.

As if that's not impressive enough, the HP Omen embraces the 'laptop' portion of its 'gaming laptop' classification, too, so use that mighty power to get some real work done through the day, with TPM security and a TrueVision Full HD WVA webcam with integrated dual-digital microphones. Unleash your full gaming potential with the HP Omen.

< Gaming laptops have come a long way, and the state of the art Omen by HP is a stunner. Slim, light and beautiful, the Omen is also a power games machine with graphics by NVIDIA and a powerful Core i7 CPU from Intel.



¹High definition (HD) content is required to view high-definition images.

²Weight will vary by configuration.

TRENDING RIGHTS

The battle lines are drawn in the tech stakes for 2015

As we get underway with the new year, it's a time to turn our attention to the big issues that are likely to dominate the consumer tech landscape for the coming 12 months.

It's looking like a bit of a battle zone as the tech giants face off with their phablets, the government tries to captures all our technology movements in one go, content owners step up their war to wrest back the ill-gotten files from bittorrenters and free-to-air and pay tv providers go head-to-head with new streaming services for online eyeballs.

DATA RETENTION

The government has laid down the gauntlet on the issue of data retention when it introduced the bill for the mandatory retention of telecommunications metadata. It wants to compel telcos to store a set of customer data for up to two years, although when it was first mooted there was confusion in government ranks about defining metadata and if it would be used to tackle cybercrime and even go after online piracy.

The scheme won't include web browsing history, but metadata as it's outlined in the bill introduced in October includes a substantial amount of detail that will be available to law enforcement agencies. The question is can Scott Ludlam and the independents, supported by rights groups such as Electronic Frontiers Australia and online activism from Get Up! and individuals themselves, and back the dark forces and stop Australia from moving towards a cyber police state?

PIRACY

One of the government's other stealth battles is trying to clamp down on piracy. Australian enjoys the dishonourable title as one of the world's most prolific downloaders of illegal content, or at least *Game of Thrones*. The government wants to make good on promises to rights holders that it will do something to stem the tide of file sharing. Three Strikes and prosecutions have been mooted, but, it's not clear if this will be put into law.



Rosalyn Page
has been a journalist for over 10 years specialising in the areas of consumer issues, technology and lifestyle. Rosalyn is the 2008 winner of the Best Consumer Technology Journalist at the IT Journalism awards. Her work is published in a range of newspapers and magazines



The studios have once again taken aim at iiNet and are trying to force the ISP to hand over details of customers that the right holders of Dallas Buyers Club believe illegally downloaded the film. Watch this space to see how this one plays out.

ONLINE STREAMING SERVICES

Netflix may or may not be coming to our virtual shores. Every week there's another rumour, but in the mean time Dendy Direct has opened its cinema doors online and this year we can expect to see Nine Entertainment's streaming service StreamCo go live and take on Foxtel's Presto and maybe even the much-delayed Hoyts Stream. Those geo-dodgers with VPNs may be looking forward to new offshore offerings such as HBO's new streaming service and CBS All Access.

NBN

The sad story of Australia's attempt at a forward-looking national broadband network will be studied in textbooks of the future. Where did it all go so wrong? It's hard to fathom how a piece of national infrastructure could elicit such strong emotion in commentators, politicians, technocrats and the general public. It's probably because so many people see a wasted opportunity lost to political partisanship that put the national interest and future ingenuity behind point scoring and the need to create a second-best plan for the sake of politics. A Gallipoli-size loss to the nation this one.

"The sad story of Australia's attempt at a forward-looking national broadband network will be studied in textbooks of the future."

PRIVACY

Facebook seems intent on ingratiating itself further into our online activities and identities, while our government wants to allow law enforcement agencies greater ability to snoop into our online footprint. Mobile devices have become our own self-chosen tracking devices and we seem to be collectively blinded by their appeal and unwilling to question what anonymity with forsaken for connectivity. Internet-connected devices are like cyber shrapnel in our pockets taking out small pieces of our privacy bit by bit.

WEARABLES, PHABLETS AND INNOVATION

The phablet battle took an interesting turn when Apple finally got around to introducing a couple of new iPhones that won't fit neatly in a pocket. It remains to be seen if it's enough to gain back those lost of the bigger screens already. How much bigger can a phone get?

And can we please come up with a word other than phablet?

THE YEAR AHEAD

These are just a few of the questions under the banner of device innovation. This year is likely to be a big year for wearables too. Smart watches, fitness tracking devices and who knows what else await the public keen to connect in new ways. A trench war more than a battle this one.

NEED HELP? EVER HAD AN ISSUE AS A CONSUMER? INVESTIGATOR CAN HELP.

If you've had an issue or had something happen and you think investigator could help, email your problem to investigator@pcandtechauthority.com.au



f Cooler Master Australia



NEPTON 240M / 120XL ULTRA HIGH PERFORMANCE

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Utilizes principles of Jet Impingement to rapidly cool hotspots.

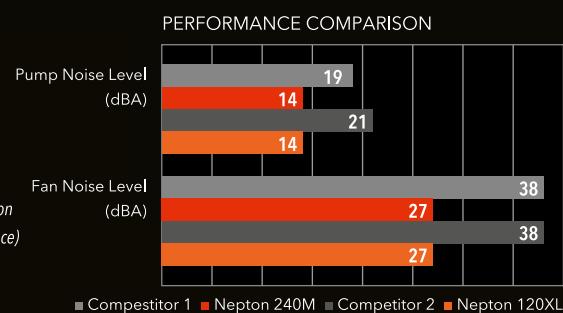


Jet Impingement Technology (Hot Spot: the hottest part of CPU)

TUBING Robust FEP Material



FAN Silencio FP 120 All-new fan outputs higher air pressure while remaining quiet.



"Performance wise, we're totally over the moon with what the Cooler Master Nepton 240M is capable of. While the pump itself has been a great performer, the main wow factor was in fact the Silencio FP 120 PWM fan with its jaw dropping near silent operation, we've never expected it to be this quiet by first glance."

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Windows

10

The full story

FED UP WITH INTRUSIVE LIVE TILES AND MICROSOFT'S OBSESSION WITH ITS NON-EXISTENT TABLET PLATFORM? **DARIEN GRAHAM-SMITH** REVEALS HOW WINDOWS 10 WILL MAKE THINGS RIGHT

On paper, Windows 8 wasn't a bad idea. The introduction of a new touch-friendly app framework, designed for both ARM-based tablet hardware and more conventional Intel devices, was bold and clever: it addressed the new tablet market head-on without sacrificing the continuity that had always been Windows' trump card.

Unfortunately, the execution was badly fumbled. The new interface discouraged newcomers with its hidden gestures - and Microsoft failed to support the nascent platform with a competitive software library. Officially, the Windows Store launched with just over 9,000 apps, but

without key names such as Facebook, Twitter and YouTube, Windows RT couldn't hope to challenge the iPad.

Microsoft also managed to alienate its desktop users by requiring them to use the full-screen, touch-first interface in place of the familiar Start menu. Presumably, it hoped this would encourage them to explore the tablet side of things - but many found the new interface inappropriate for their hardware, and resented having it forced upon them. Businesses in particular opted to stay away, rather than face the training and support costs of adapting to the new interface. Not only had Microsoft failed to establish its new tablet market, it had also

thrown away goodwill and custom from its existing desktop business.

Since the initial release of Windows 8, things have got a little better, but neither Windows 8.1 nor the confusingly named 8.1 Update managed to salvage Windows 8's reputation - chiefly because Microsoft still couldn't let go of the highly symbolic Start screen. At the start of the year, Windows 8's share of the desktop OS market had stalled at around 12%. According to market-research firm Net Applications, that share actually fell slightly in mid-2014, as businesses migrating away from Windows XP still chose to invest in Windows 7 rather than deal with Windows 8. A more



SORRY...

substantial conciliation was needed.

That arrived at last on 30 September, when Microsoft's Terry Myerson and Joe Belfiore held a low-key presentation in a small room in San Francisco. Just a few dozen reporters were invited, and although a video was later made available, the event itself wasn't televised or streamed. Microsoft was in humble mode; and while it had been widely anticipated that the Start menu would be brought back

into Windows for non-touch hardware (a tantalising screenshot of the restored interface had been shown in April at

Microsoft's annual Build conference), few were prepared for the scale of the climbdown that was about to be unveiled.

The first surprise was the name.

Before the event, speculation had focused on whether Microsoft would make a break with the tainted Windows 8 brand and move up to Windows 9. The idea that it

"Windows 10 is not going to be an incremental step from Windows 8 – it is going to be a material step"

might skip ahead to version 10 hadn't been anticipated by anyone - except, as pundits with long memories pointed out, the US technology website infoworld.com, which had suggested the move in a joke news story published for April Fool's Day 2013.

Officially, the version jump reflects how much Windows is changing in the new release: "Windows 10 is not going be an incremental step from Windows 8.1," explained Microsoft marketing VP Tony Prophet, speaking after the announcement. "Windows 10 is going to be a material step." Online commentators quickly pointed out a second possible reason: an operating system named "Windows 9" might be misidentified

by poorly written programs as Windows 95 or 98, triggering the wrong behaviour.

A NEW START

As you'd expect, Windows 10 introduces several new end-user features; you'll find a rundown of our favourites on p24. And it's expected that more goodies will be unveiled between now and the final release: the purpose of September's presentation, Belfiore announced, was to focus on the "core experience". "We're not talking about cool new consumer features," he teased. "That comes later."

Yet, significantly, Microsoft was less coy about business features. Early on, Myerson declared that "one of the most important customers for Windows is the enterprise. Windows 10 will be familiar for companies," he pledged. "They'll find all the tools they're used to finding, [and] Windows 10 will be compatible with all the traditional management systems used today."

As he spoke, a new page was being added to the Microsoft website, detailing business-friendly features planned for Windows 10, including a container-based encryption scheme, an in-place rollout and management model, and improved control over Windows Update. Clearly, Microsoft had realised it needed to win back the favour of its disgruntled business market. "Windows 10 is going to be our greatest enterprise platform ever," Myerson said.

One particular change of emphasis will surely be welcomed by conventional desktop users: when Windows 10 detects it's installed on non-touch hardware, it automatically chooses the Start menu interface instead of the Start screen, and associates known file types with desktop apps, rather than the full-screen view used by Windows 8. Belfiore made clear that Microsoft had repented of its previous error in pushing too much of the tablet side into desktop users' faces. "We're looking to find the balance," he said, "so that Windows 7 users get a familiar experience on the devices they already have."

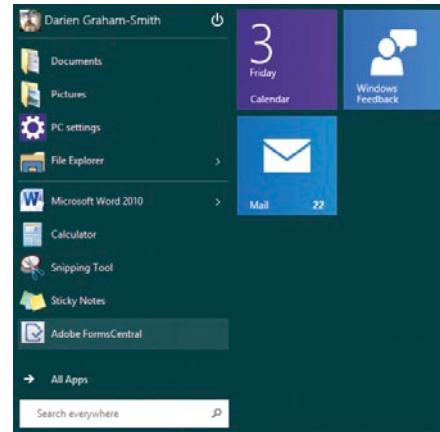
"We want Windows 7 users to have the sentiment that yesterday they were driving a first-generation Prius, and now with Windows 10 it's like a Tesla," he went on. "They don't have to learn any new way to drive." Point taken.

WORKING ACROSS PLATFORMS

While focusing on the desktop, Microsoft hasn't abandoned the tablet-style interface. However, it hopes to offer a more flexible experience than the stark binary of Windows 8. "We're trying to be thoughtful about a UI that goes across all devices," declared Belfiore. He demonstrated a work-in-progress interface - part of what

> The new Start menu bridges the gap between the classic and Modern interfaces

✓ Razor-thin window borders and soft shadows are the order of the day



"We're delivering one application platform – one store, one way for applications to be discovered, purchased and updated across all of these devices"

Microsoft is calling Continuum, which selects the right interface for each device - that combines elements of both interfaces into a hybrid Start screen, showing both Live Tiles and a taskbar, to make better sense on a touchscreen laptop.

Windows 10 also allows apps to launch in regular desktop windows rather than insisting on full-screen or split-screen mode. This makes it vastly more convenient for mouse-based users to try out games and tools from the Store. Similarly, the Live Tiles previously located on the Start screen have been moved into the new Start menu, where they can be glanced at without interfering with the main desktop view. There's no longer anything to discourage desktop users from dipping into the Store - hopefully creating a virtuous circle that will at last encourage more developers to actually target the platform.

Perhaps the real significance of Windows 10, however, isn't to do with specific features, but with its overall reach. Introducing the new OS, Myerson presented a concept slide showing Windows 10 running on a wide range of devices, from smartphones

to tablets, laptops, desktops, games consoles and smart televisions. "We're delivering one application platform," he declared. "One store, one way for applications to be discovered, purchased, and updated across all of these devices." In other words, the same Modern apps and services that run on the Windows 10 desktop today will also run natively on the next generation of Windows Phone handsets. We may even see a new generation of Windows RT-type tablet hardware, although it remains to be seen whether it will be possible to upgrade existing RT devices.

While Microsoft was previously accused of focusing too much on the consumer market in the development of Windows 8, the company is also now starting to show how tablet-style apps can work for businesses - and it's a persuasive narrative. The Modern framework supports a quick, visual development model; it's heavily sandboxed; it is (at last) amenable to both touchscreen and desktop environments; and it's highly host-agnostic. This means no repeat of the Windows XP fiasco, where companies clung to the ageing OS because their in-house



applications and processes couldn't be easily moved to a more modern platform, and as a consequence of that, a decidedly lukewarm level of enthusiasm for the new OS from IT admins. To support it all, companies will even be able to curate their own in-house app stores, containing their choice of bespoke and third-party apps.

LOOKING INSIDE

Before the final release of Windows 8, Microsoft distributed a series of preview builds, but seemed to turn a deaf ear to critical feedback. This time around, the company really wants us to know it's listening - and to make sure everyone gets a say, it's created the new Windows Insider Programme, giving regular users a chance to test and comment on a "Technical Preview" build that, in the past, would likely have been restricted to developers.

If you're interested in trying the Technical Preview, all the usual caveats apply about not using pre-release software on critical systems. Also note that the current Insider build is programmed to stop working on 15 April 2015 - which may be the intended release date of the full OS, although so far all Microsoft has said is that it will arrive after next year's Build conference (29 April to 1 May 2015).

In use, though, you'll find the build is pretty robust. That's just as well as, according to Microsoft's own figures, in the first two weeks of running the Windows Insider Programme, around 640,000 people had started using the technical preview as their daily OS.

Using the Technical Preview is just like using a regular edition of Windows, except for the presence of occasional pop-ups, asking questions such as: "How easy is it to switch between apps using the multitasking button?" You're invited to rate how accessible you found each feature, on a scale of 1-5, and to provide any comments. If you have anything else to share, you can launch the dedicated Windows Feedback app, select the appropriate area of the OS (such as "Hardware and Devices" or "Personalisation and ease of access") and leave a remark. Cleverly, you can also see other people's comments and click to add your voice, causing the most popular requests and comments to bubble to the top.

Besides giving manual feedback, users also agree to have their usage remotely monitored by Microsoft, so the OS can be tuned to better suit the ways people really use it. It's been suggested that during the test period Microsoft might even send different updates to different users, so it can monitor how different approaches affect user satisfaction and efficiency. After the stubbornness of the Windows 8 design process, it's a refreshing approach.

THE VERDICT

In the developing story of Windows 10, it's tempting to see parallels with the transition from Vista to Windows 7 - and the next Windows certainly has the potential to be as popular as that much-loved desktop OS. But to look backwards is to sell Windows 10 short, because this vision goes further than merely replicating past glories. Where Windows 7 sought principally to overhaul the desktop, the new release represents a credible second go at establishing a new conception of what Windows means and where it runs - without leaving behind the vast ranks of desktop users.

It's too early to declare success, of course. We'll have to wait to find out what Microsoft does with all the feedback it's collecting, whether desktop users are willing to come back into the fold, and whether the Windows Store can gain the momentum it needs to compete with its rivals.

What we can say is that Windows 10 represents a turnaround. In the past three years Microsoft seemed to have set itself stubbornly on a course to irrelevance. To our great relief, Windows 10 puts Microsoft



back on track. It finally extends the olive branch to desktop users, while simultaneously opening up the tablet platform to them. It gives businesses solid reasons to upgrade their desktop systems. It even promises a seamless multi-device experience, allowing your apps and services to follow you from your phone to your work PC and up into the cloud - a degree of loyalty-rewarding integration that

Android and Apple can't match. If early rumours of Windows 10 being a free upgrade for users of Windows 8 turn out to be true, we'll have to say that Microsoft really has put almost everything right.

Almost everything? Well, the one thing Microsoft hasn't done is apologise for putting its customers through three years of frustration. But we're not offended: every time you open the Start menu, you'll be looking at a functional expression of penitence that's more meaningful than any corporate statement. And the rewards of Microsoft's soul-searching are self-evident: Windows 10 promises to be the start of a great new chapter in computing for home users, business, mobile users and Microsoft itself. It is, if you'll pardon the expression, a Win-Win.

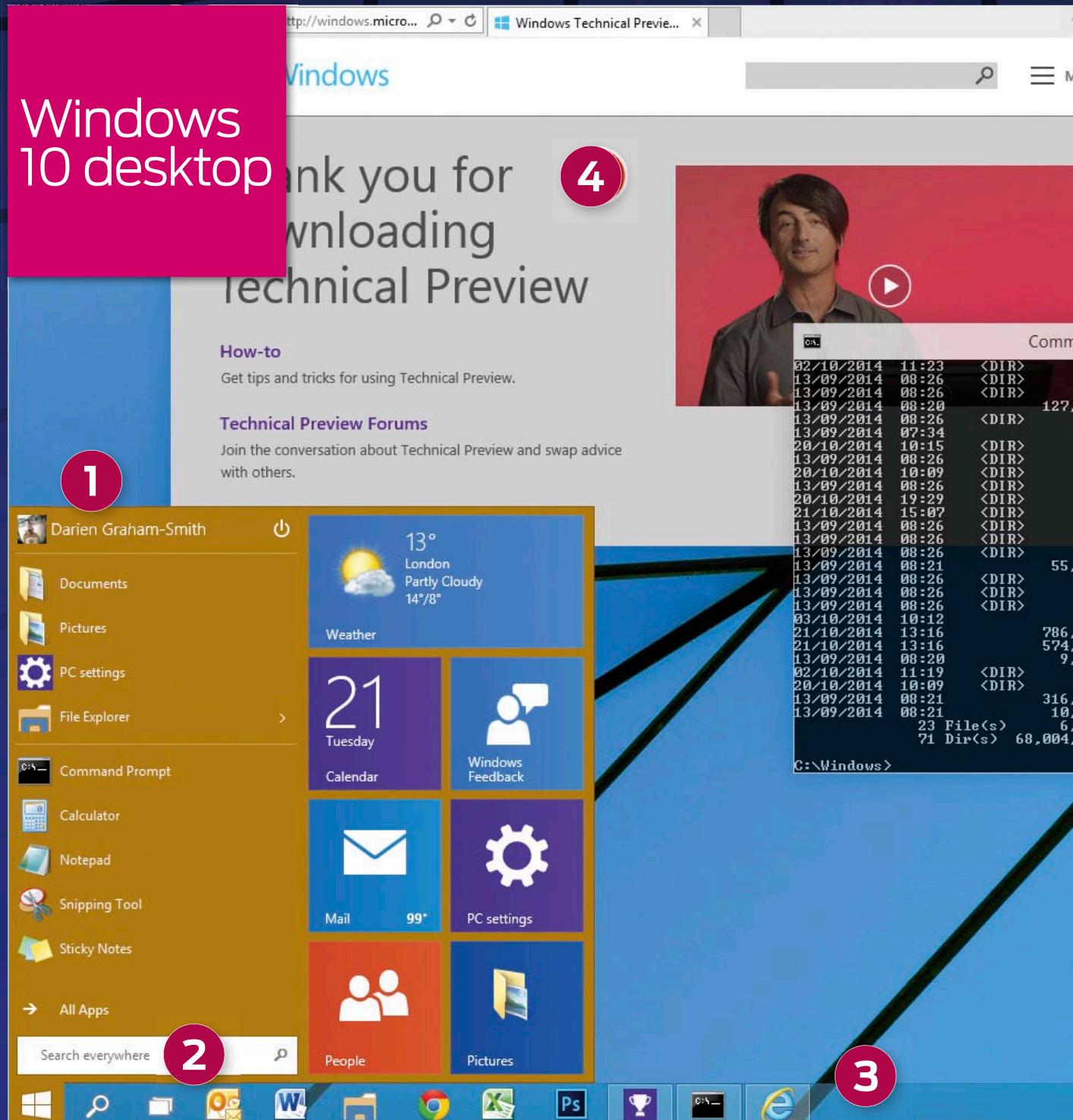


< Moving Modern apps into regular windows should make them far more appealing to desktop users

✓ New multitasking tools make it easy to work with multiple applications and virtual workspaces

"In the past three years Microsoft seemed to have set itself stubbornly on a course to irrelevance. To our great relief, Windows 10 puts Microsoft back on track"

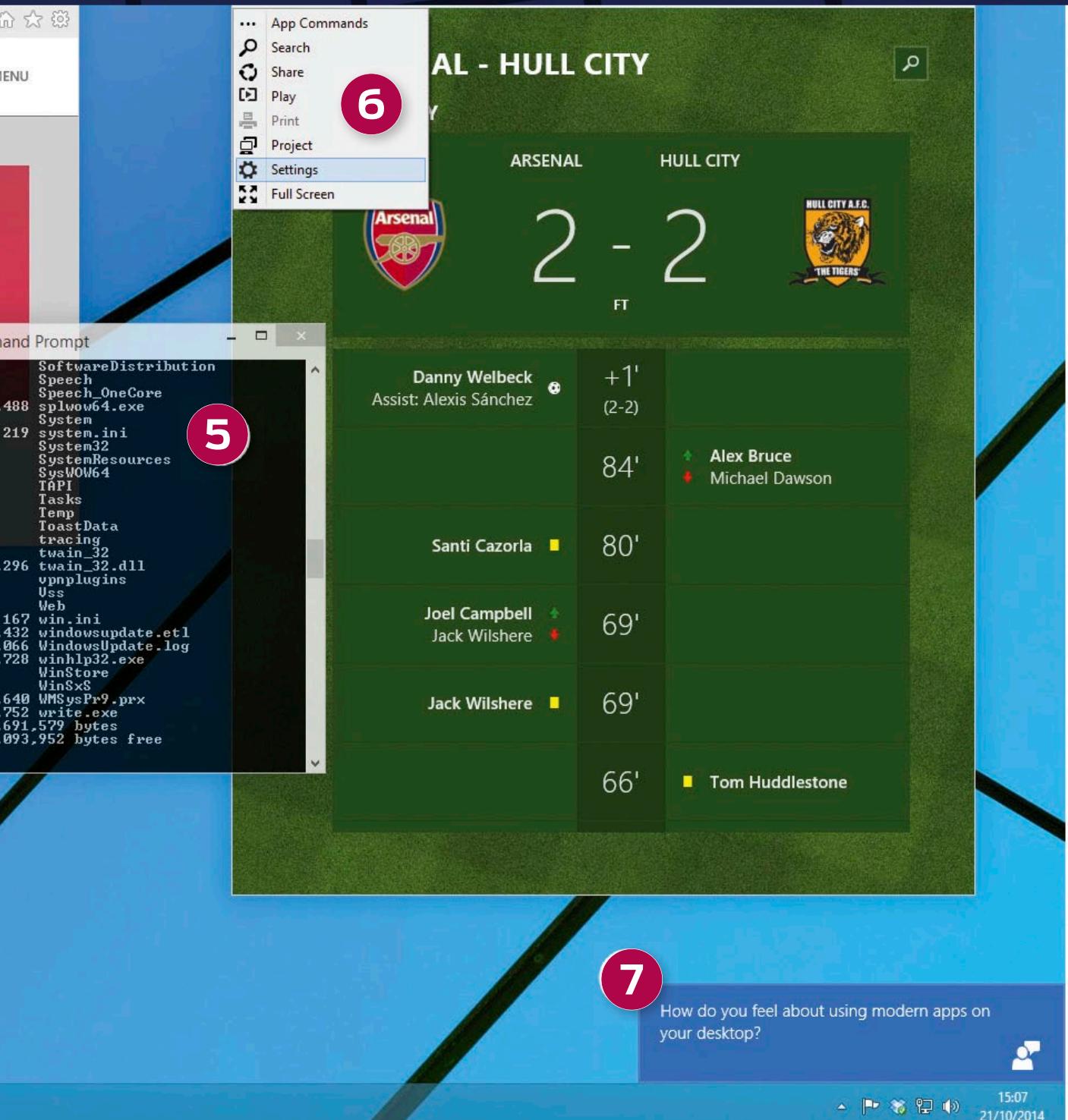




1 The restored Start menu in all its glory. The left half does much the same job as the old Windows 7 Start menu, while the right half shows the Live Tiles that previously appeared on the Windows 8 Start screen. You can choose from the same selection of tile sizes as before, and the menu expands horizontally to accommodate however many tiles you pin here.

2 The new Search icon at present simply replicates the search function of the Start menu – but it's rumoured that in a future build this might launch Microsoft's Cortana digital assistant (similar to Apple's Siri). The new Task View button gives a quick overview of all your open windows and apps, and also lets you create additional virtual desktops and switch between them.

3 The taskbar now shows a discreet bar beneath apps that are open on a different desktop: clicking on a barred icon jumps you to the appropriate workspace. You can move an application from one desktop to another by pressing Windows+Tab, right-clicking on the application thumbnail, and selecting "Move to..." from the dropdown menu. It's a clunky system, but we hope it will be made slicker in the final release.



4 Microsoft is keen for you to give Windows 10 a thorough road test, so you'll find plenty of information and discussion forums online - as well as this friendly video of Joe Belfiore introducing the new operating system.

5 Microsoft has overhauled the command prompt in Windows 10; it now supports Windows' native copy-and-paste functions, and properly reflows when you resize the window.

6 For desktop users, Modern apps now open in a window, which can be moved around freely and resized; some apps won't shrink below certain dimensions, however, and may hide or show interface elements depending on the size of their window. The charms also move from their hiding place off the side of the screen to a convenient menu.

7 As you work with the Windows 10 Technical Preview, panels will pop up from time to time asking for your feedback on various aspects of the operating system. If there's something specific you want to communicate, you can open the dedicated Windows Feedback app (pinned to the Start menu) at any time and share your thoughts - or add your vote to comments left by others.

Our ten favourite features

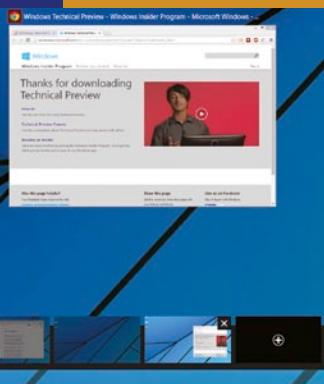
2 Return of the Start menu

Some people love the Windows 8 Start screen, and in Windows 10 it's still available. For many desktop users, though, the iconic Start menu was less intrusive and a better fit for their workflow. If Microsoft had changed nothing else in Windows 10, the return of the familiar menu would surely have won over many of those who had elected to give Windows 8 a miss.



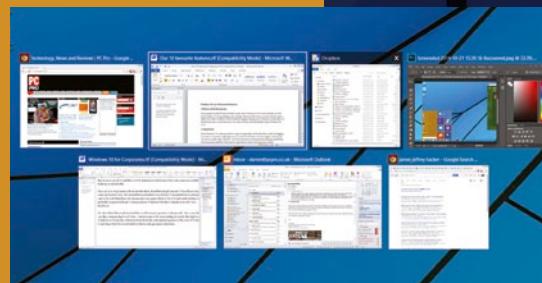
3 Multiple virtual desktops

Windows 10 is the first version of the OS to come with native support for multiple virtual desktops. You can create multiple desktops, and switch and move apps between them with ease. It's convenient for those times when you're working with a particular group of windows, then momentarily need to nip off and do something else.



1 New Alt+Tab behaviour

Switching between applications is something many of us do all the time. In Windows 10, Alt+Tab brings up an updated view of your open windows, with generously sized previews and labels with icons to help you more easily spot what you're looking for. There's also a new Task View button, which provides a clickable overview of all your open windows and desktops.



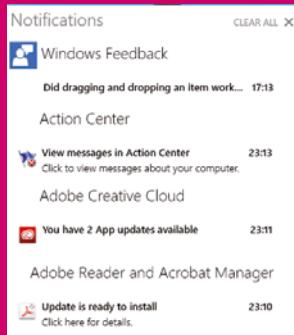
4 Snap Assist

Since Windows 7 it's been possible to "snap" an application to fill half of the screen by dragging its window to the left or right edge of your monitor. In Windows 10, this triggers a thumbnail view of your other open windows - just click one to have it automatically spring up and fill the remaining space perfectly. Running two applications side by side becomes a breeze.

5 Unity across devices

Perhaps the most exciting aspect of Windows 10 is the promise that Modern apps will run anywhere – not just on laptops and tablets, but on servers and smartphones too. That's something Android and iOS can't match: the prospect of creating and using exactly the same tools across all your devices, without compromise.

6 Notification centre



It hasn't yet arrived in the Technical Preview, but leaked videos of an unreleased Windows 10 build show a new notification centre that collects together your notifications from

the OS and application in one place, for you to review and handle at your leisure. It's a simple idea, borrowed from the mobile world, which means you never need to worry about missing an important message.

7 Modern apps on the desktop

The desktop isn't only for desktop applications any more. At last, Windows 10 lets Modern apps run in draggable, resizable windows, with the charms moved into a handy dropdown menu. Add in the new Live Tiles panel at the side of the Start menu and you've got an operating system that makes it possible to use both types of application side by side – something that seemed impossible in Windows 8.



8 The Continuum

The Continuum is Microsoft's idea of how the OS can adapt to working in both laptop and tablet mode. This is still under development, but Windows 10 gets off to a good start by automatically selecting the Start screen and full-screen apps when installed on touchscreen hardware, and defaulting to desktop standards when used on a PC or laptop.

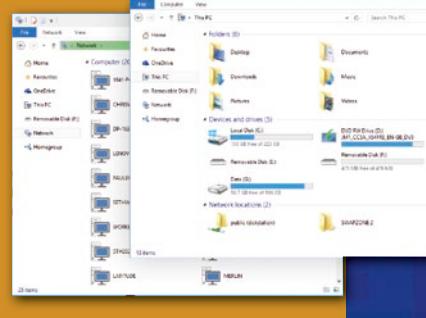


9 Upgraded command prompt

This one won't be for everyone, but power users will love the fact that copy-and-paste finally works in the Windows 10 command prompt. In fact, there's a whole tab full of "Experimental" features that make it easier to select and edit text. You can also choose to automatically reflow the window contents when you resize it – and an opacity slider enables cool translucent windows.

10 New look

Windows 10 looks much like its predecessors, but with a few elegant visual tweaks: window frames are reduced to a single pixel in thickness, and a soft shadow behind windows makes it easier to see at a glance which is on top. Truth be told, the effect looks a bit like OS X, but we'll take that over the flatly functional Windows 8 desktop any day.



Apology accepted?

WE ASK WHETHER WINDOWS 10 GOES FAR ENOUGH TO MAKE MICROSOFT'S CUSTOMERS, INDUSTRY PARTNERS AND EVEN RIVALS FORGIVE ITS EARLIER MISSTEPS

"The days of a new Windows release driving PC sales are long gone - but we are enjoying the clarity of vision that's coming from the new Microsoft leadership. Businesses are demanding an integrated experience between all platforms, and how Windows 10 deals with that will be key."

Tim LeRoy, head of marketing at Novatech

"APIs such as Continuum promise new ways for an app to support two-in-one devices, and the "universal app" method, introduced earlier this year, should make debugging and updates much easier. Plus there's the promise of the removal of the infuriating pop-out charms. It looks like a move in the right direction."

Mark Newton, developer

"When your market share is going down rather than up, your next move needs to be a stunning innovation, or a strategic retreat. Since it was radical ideas that got it into trouble, it's understandable that Microsoft has gone for the latter. But if it really can create a consistent user experience for phones, tablets and laptops, even Apple users will be impressed."

Adam Banks, MacUser editor

"Windows 8 was a non-starter for us, largely because of the way Microsoft tried to make everyone use Metro. With features such as Azure Active Directory support and enterprise data protection, Windows 10 feels like an effort to address what businesses really need."

Joe McFadden, IT director at the National Theatre

"I actually like Windows 8.1, but many of our customers use third-party Start menu tools to turn it back into 'normal Windows'. Windows 10's concessions to desktop users should improve the experience: it does look like Windows 7 with a few extra squares, but that's no bad thing."

Ben Miles, sales director at Chillblast

"Microsoft went too far with Windows 8, in terms of walking away from the old and embracing the new. I think it's achieving a reasonable balance with Windows 10. But I wouldn't characterise this as an apology. Windows 7 was a solid release, and commercial customers simply will not make two product adoptions in such a short time period."

Al Gillen, analyst at IDC

"I took a gamble and bought a Surface RT, but with too few apps, and no way to download software other than the Store, for the past two years I've found myself with a useless lump of glass and metal. I feel like a prize fool for falling for Microsoft's hype and spending more than \$700 on a Surface RT tablet and keyboard. Apology not accepted."

Tim Danton, Surface RT tablet owner

"I was becoming concerned about the next release of Windows, but it looks like there has been some thought for business users this time. Our plan is to skip Windows 8 and move directly to Windows 10: it's the same as when we moved from XP to Windows 7. Why can't Microsoft release two good systems in a row?"

Chris Riley, IT manager at Multisys Computers

"Windows 8 reflects the problem of catering for two different markets. This isn't the first time Microsoft has taken the wrong direction and had to effect a major change. Windows 10 is not so much an apology as a necessary move by Microsoft, because its customers weren't willing to move."

Angela Eager, analyst at TechMarketView

THE BUSINESS VIEW

by Steve Cassidy

It's clear that Microsoft has had the world's most expensive wake-up call - far worse than the one the company had over Vista - but what it's published so far about Windows 10 is reassuringly lacking in flimflam. We're actually seeing straightforward promises not to rock the corporate boat. Start menu? Yes. Better protection against update hell? Yes. Smarter bridging of user-interface conundrums across different screen sizes and device types? Yes again.

A particularly interesting idea is Microsoft's plan for a web of authentication, to manage and protect your documents, even after they leave your machine. If it works then no matter where your documents go, the recipients, editors, copiers and USB-stick-toting thieves can all be tracked and traced. I saw a walkthrough of this technology in Redmond in May, and it's an immensely ambitious effort that should appeal to corporates with concerns about leaky document management - although whether this is more about Word files or SQL databases (which don't have the same traceability built in) is debatable.

One thing I'm wary of is promises about mobile device management. When the topics came up

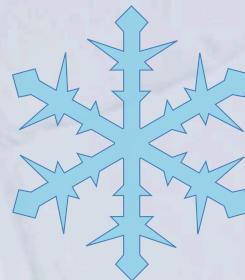
back in May, the assembled journalists waved their Nokia phablets in anticipation, only to be told that these developments were quite likely to be iOS and Android first, and would probably require at least Cortana-release Windows Phone to function on Microsoft's own hardware.

Overall, though, Windows 10 looks like a blessed relief from the anticipated agonies of the end of Windows 7. I only hope that Microsoft can stick to its early promises.

▼ Can Satya Nadella bring the love back to PC?



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Inside Intel's Broadwell architecture

INTEL'S LATEST ARCHITECTURE FORMS THE BASIS OF ITS FASTEST, MOST POWER-EFFICIENT PROCESSORS YET. **MIKE BEDFORD** EXPLORES THE TECHNICAL TRICKS THAT PROVIDE US WITH EVER-FASTER CHIPS

If you haven't yet come across Broadwell, you soon will: it's Intel's codename for the technology that will power next year's fifth-generation Core i3, i5 and i7 processors, as well as the new Core M series. According to Intel's now famous "Tick-Tock" roadmap, it's a "Tick" - that is, a die shrink of its predecessor Haswell, from 22nm to 14nm.

In the grand scheme of things, a die shrink may not seem significant: if you're looking for major new features, you'll have to wait until the next "Tock", expected late next year in the form of the all-new Skylake core. With the latest consumer devices, though, it's increasingly the case that performance and features are less of an issue than battery life - so improving efficiency is becoming more and more important in CPUs.

THE 14NM PROCESS

In semiconductor manufacture, the process size officially represents half the distance between identical features in an array of memory cells. It's also roughly the length of a single gate within one of the billions of microscopic transistors that make up a CPU. The move from 22nm to 14nm is a big proportional drop - more so than it may appear, because the gate length represents only one dimension of a two-dimensional design. In the case of the move to Broadwell, the silicon die is scaled down to a relatively paltry 63% of the area of a comparable Haswell chip.

The benefits of a smaller die are well known. Smaller transistors lose less power to leakage, and don't heat up as much, so

they draw less power and need less in the way of cooling. Practically speaking, this means they can power slimmer, quieter devices, with longer battery life, without compromising performance.

Using smaller transistors also means that more can be packed onto a given area of silicon: Intel's first commercial processor, the 4004, released in 1971, used a 10µm process to build a comparatively modest 2,300 transistors onto the die. To implement today's CPUs at that scale, you'd need a die the size of a door. Quite apart

"The Core M is effectively a lightweight Core i3, designed for compact fanless devices such as ultra-thin laptops and Windows tablets"

from the practical problems of building such a creation, there's a cost issue: ultra-pure silicon wafers aren't cheap, so shrinking the die lets the manufacturer make more of its raw materials.

Needless to say, it's not easy to keep continually shrinking the process, which is why the Tick-Tock model sees Intel spend fully half of its time focusing on improving efficiency. Even so, Intel CEO Brian Krzanich admitted back in May that it was taking longer than anticipated to get Broadwell into full production. That's why the company has decided to hold back the mainstream chips until early 2015 and launch Broadwell before Christmas in the form of the new Core M processor.

THE CORE M PROCESSOR

Since the key advantage of Broadwell is power efficiency, it makes sense for Intel to debut it in a design that plays to

that strength. The Core M is effectively a lightweight Core i3, designed for compact fanless devices such as ultra-thin laptops and Windows tablets.

The first Core M devices are already starting to appear such as the Lenovo Yoga 3 Pro, which we will review in the next issue of *PC & Tech Authority*. Although it's being launched in three models, all are quite similar, as you can see opposite.

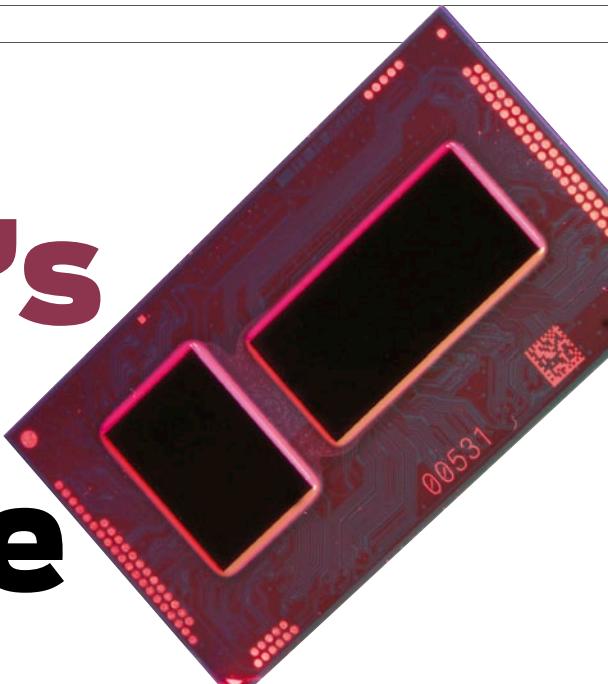
In terms of processing power, the Core M isn't much to write home about: Intel claims that for everyday tasks it delivers around twice the performance of "your old laptop"

- based on a four-year-old Core i5-5200U. We expect it to fall short of the performance of a modern Core i3.

That's not the point of the Core M, though.

The real news is that these processors are designed with a nominal thermal design power (TDP) of only 4.5W - a figure Intel has identified as the "sweet spot", in terms of heat generation, for an 11.6in device that's 8mm thick. Optionally, the 5Y10a can be configured down to 4W. For comparison, the lightest Haswell parts - the Y-series models, designed for Ultrabooks and tablets - are designed to draw up to 11.5W. That's a huge drop in maximum power consumption - and Intel claims a 60% reduction in power consumption when the processor is idle. The company has also worked on improving the efficiency of the supporting hardware, including a new digital signal processor (DSP) called "SmartSound".

Such power reductions don't tell the whole story, however. The screen, hard disk and other parts of the system all consume energy, too: in our light-use battery test, the Lenovo Yoga 3 Pro lasted only around eight hours, placing it on a par



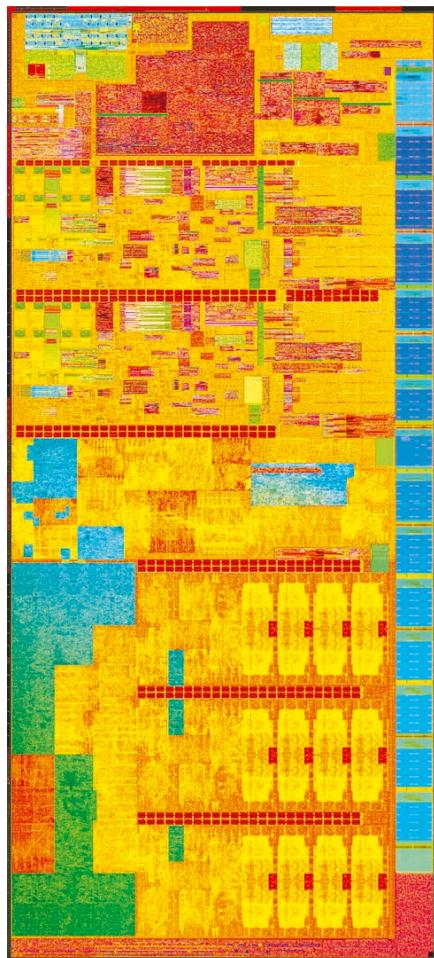
with last-generation Ultrabooks. Hopefully future designs will manage to eke a longer life from the architecture.

OTHER BROADWELL MODELS

Since Broadwell is primarily a die shrink, we're not expecting the next generation of high-end processors to bring major performance advantages over Haswell; two years ago, when the 22nm Ivy Bridge architecture replaced the 32nm Sandy Bridge, we saw an overall improvement of only 4% in benchmark scores between top-of-the-range chips.

This may explain why Intel is in less of a hurry to get new Broadwell-based Core i5 and i7 models out of the door. Even when such chips become available, we probably won't be advising high-end desktop users to rush out and upgrade to Broadwell. Not only is doing so unlikely to yield worthwhile benefits, it will be an upheaval, since you'll need a motherboard with a new 9 Series chipset (although Intel has indicated that some 8 Series boards might be usable after a BIOS update, as the sockets are expected to be physically the same). For lower-end models, the switch

✓ The Core M design comprises 1.3 billion transistors



	Cores/threads	Base frequency / Turbo Boost	GPU	Graphics base speed / Turbo Boost	L3 cache	TDP
Core M-5Y10	v2/4	800MHz / 2GHz	Intel HD Graphics 5300	100MHz / 800MHz	4MB	4.5W
Core M-5Y10a	2/4	800MHz / 2GHz	Intel HD Graphics 5300	100MHz / 800MHz	4MB	4W / 4.5W
Core M-5Y70	2/4	1.1GHz / 2.6GHz	Intel HD Graphics 5300	100MHz / 850MHz	4MB	4.5W

makes even less sense: it's rumoured that Intel may not bother producing low-end Broadwell CPUs for the desktop, and will instead stick with Haswell-based chips for this market.

This doesn't mean power efficiency is Broadwell's only benefit, however. As we've mentioned overleaf, the GPU has been substantially beefed up, promising slicker performance, especially in games. Broadwell also introduces a handful of instruction-set extensions: the new ADX Extensions provide upgraded performance in arbitrary-precision calculations, while the RDSEED instruction generates a non-deterministic series of random bits that can be used to seed an external random-number generator.

This latter tool does nothing for performance, but makes it even less likely encryption systems can be broken by analysing the pseudorandom numbers used to generate the encryption key.

WHAT BROADWELL CHIPS (PROBABLY) WON'T DO

Intel hasn't yet shared technical details of next year's mainstream processors, so these are still open to speculation. However, one thing we probably won't see is an increased number of cores. It's true that Intel's Core i7-5960X, which was released in August, offers for the first time eight physical cores (servicing up to 16 threads, courtesy of Hyper-Threading). But despite its fifth-generation model number, this isn't actually a Broadwell chip, but an enthusiast-class Haswell-E 22nm processor with a huge 140W TDP and a retail price of around \$1300.

Broadwell is much more about efficiency, and that's why we expect Intel won't be throwing in extra cores. Doing so increases the size, complexity and heat generation of the chip. It also doesn't benefit performance as much as you'd hope; although programmers are getting better at writing multithreaded code, there are still plenty of processes that still don't benefit from additional cores.

Even when a task can be spread across a large number of cores, all of the cores have to share a single interface to other circuitry on the motherboard, as well as sharing some of the on-chip cache memory. This can be beneficial when it comes to passing data from one core to another, as

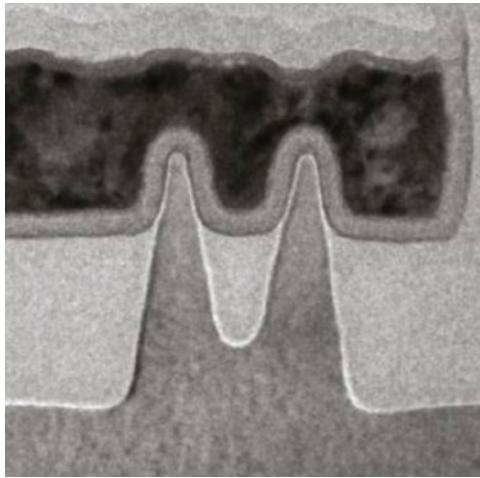
on-chip communication is much faster than it would be between two separate chips. But adding cores increases the contention for resources, so you'll see diminishing returns. This is why, almost a decade after the first dual-core chips arrived for desktop PCs, the typical personal computer still has only two or four cores, while processors with dozens of cores are found only in specially designed server and workstation configurations.

We also probably won't see higher clock speeds. For many years in the 1980s and 1990s, Intel continually increased performance by dialling up clock speeds. In the past decade, however, the upper range of clock speeds has barely changed. That's because increasing the clock speed causes the processor to consume more power. When microprocessors had only a few

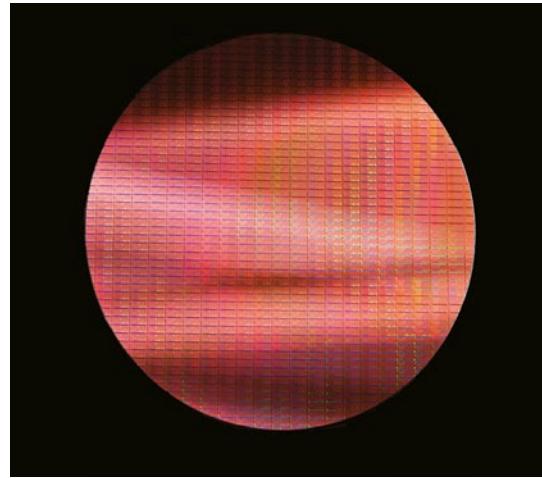
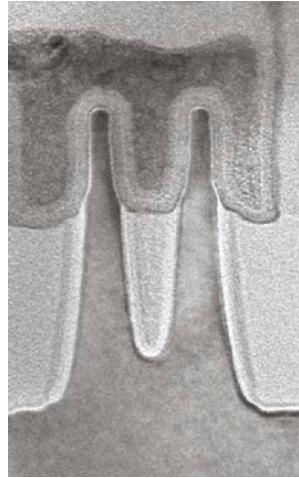
"It's been widely leaked that Broadwell Core i3, i5 and i7 processors will stick with DDR3, while server-class Xeons move up to DDR4"

million transistors on the chip, and were normally fed directly from the mains, it didn't matter a great deal if the transistors were inefficient. But as transistor counts have approached the billion mark, and battery-powered computing has overtaken the desktop, the amounts of power being consumed – and heat generated – have become significant. Now that battery life is such a priority, it seems very unlikely that we'll ever see speeds ramp up in the way they did back in the 1990s.

This doesn't mean the 4GHz of the current top-end Haswell Core i7 is necessarily the best we can expect. As of Sandy Bridge in 2011, Intel has unlocked its top-end processor models, so the user can drive the Turbo Boost as high as they like – the only limit being the chip's power consumption and temperature requirements. As Broadwell reduces both, we won't be surprised to see high-end, unlocked models running in excess of 5GHz.



▲ A 22nm Haswell transistor (left) compared to a 14nm Broadwell component (right)



▲ Shrinking the die allows more chips from a single silicon wafer

WE'LL HAVE TO WAIT FOR DDR4

Another rumour that's been floating around is that Broadwell might introduce support for DDR4 memory. It's a sensible idea, given Broadwell's focus on efficiency: DDR4 is less power-hungry than DDR3, running at 1.2V rather than the 1.5V of the older technology. It's also a technology that Intel has already embraced at the upper end of its range, again with Haswell-E. However, it's been widely leaked that Broadwell Core i3, i5 and i7 processors will stick with DDR3, while server-class Broadwell Xeons move up to DDR4.

At any rate, the advantages of DDR4 are, again, not as great as they may sound. The key benefit of DDR4 is that it enables the CPU to fetch instructions and data much more quickly: where DDR3 supports operating frequencies between 800 and 2,133MHz, DDR4 establishes 1,600MHz as a minimum speed, rising to a maximum of 3,200MHz with a compatible chipset and suitable DIMMs.

In practice, though, ramping up the speed of the memory bus doesn't automatically double memory throughput: it helps, but the latency of the memory chips is also a big factor, representing how long the processor spends waiting around before the data it's requested starts to arrive.

On today's DDR4 modules, that's comparable to the latency of DDR3 - and currently, DDR4 DIMMs also tend to cost around 20% more than DDR3.

Still, there's no reason for gloom: DDR4 support is expected to arrive in Skylake next year. By then, latencies should have improved and prices should have fallen.

ALL YOU NEED IS CACHE

Although system memory may not be getting a speed boost, one variable that Intel could tweak to improve performance is the amount of on-chip cache - superfast

memory that's integrated within the processor, used to store copies of recently used data or instructions, and those in nearby memory locations, so the CPU can access them right away if they're needed.

In recent history, Intel has avoided tinkering with the ultra-fast L1 and L2 caches - every Core i3, i5 and i7, dating back to the very first Nehalem chip in 2008, has featured 64KB per core of L1 and 256KB per core of L2.

Shared L3 cache however has varied in different chip models: desktop Core i7 models have tended to have 8MB of cache, while more lightweight and mobile parts have had as little as 3MB - and some Celeron-branded models based on the same core have cut this right down to 1MB.

BOOSTED GRAPHICS

As onboard graphics have become more powerful, and that is now particularly important and effective in the mobility space,

the importance of L3 cache has increased, as it can serve both the CPU and GPU cores. Notably, the Core M models, despite nominally sitting at the bottom of the stack, have a 4MB cache - larger than the 3MB found on low-end Haswell Core i3s. Intel might be planning a similar upgrade in other models to assist graphics performance - a move which could also help desktop computing when the GPU isn't working too hard.

It's worth noting that versions of Haswell using Iris Pro graphics also feature a new 128MB L4 cache, known as the eDRAM. Like the L3 cache, this is shared between the CPU and the GPU, so it can speed up both processing and visual tasks: gaming benchmarks have shown a performance increase of 20% to 60%, thanks to the presence of eDRAM.

We expect Broadwell will follow suit by incorporating this L4 cache in the high-end models using Iris Pro-branded graphics. ●

BROADWELL'S NEW GPU

Although the main CPU core in Broadwell is almost identical to the Haswell design, it's been partnered with an updated GPU. This isn't the first time Intel's snuck such an upgrade into a "Tick": in 2012, the Ivy Bridge architecture was a die shrink of the previous Sandy Bridge architecture that came with a completely new GPU.

The first Broadwell GPU we'll see will be the model built into the Core M processor, known as Intel HD Graphics 5300. Even though this is the most lightweight GPU offered, it takes up approximately half of the entire die size. This is partly a reflection of how important graphical performance is to Intel's vision of lightweight computing, but OpenCL 2 is also supported: Intel claims a 20% improvement in graphical computing performance over Haswell.

When it comes to visuals, the hardware supports DirectX 11.2 and OpenGL 4.2 and can happily drive a 4K (3,840 x 2,160) display. The Quick Sync Video decoder has also been updated to add support for Google's VP8 compression format. These features will almost certainly be the same across the entire GPU family: in the current Haswell range, the difference between graphical tiers is restricted to the number of execution units, the GPU clock speed and, in the case of Iris Pro, the presence of 128MB of extra on-chip memory.

Although it remains to be seen exactly how the different HD Graphics options will stack up, we already know the names of the parts that are coming: the range will include HD Graphics 5300, 5500, 5600 and 6000, plus Iris Graphics 6100, Iris Pro Graphics 6200 - and, tantalisingly, a new model called Iris Pro Graphics P6300. What that "P" denotes, and how performance stacks up against discrete GPUs and AMD's APU chips, remains to be seen.

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IN THE LABS

You won't find better reviews anywhere in Australia!

A tale of two products

BEN MANSILL PONDERS USEFULNESS AND UTILITY.

The utility of the products we've group-tested this month couldn't be in greater contrast. On the one hand we have PC power supplies, a mundane, unspectacular but inescapably necessary item that every single one of us owns at least one of. Each of us would have purchased several, or several dozen, over the years, and I bet that most of us didn't give more than a passing thought to which one was best.

Then we have smart watches. While it's early days in the evolution of this product category, it can truthfully be said that there's very little that they actually add to our lives that could be described as 'essential'.

The 'wearable' category was loudly predicted to explode this year, and that's exactly what's happened. Well, at least in terms of almost every major and minor player in the consumer electronics scene having one, or a few, for sale. Heck, the Chinese factories are pumping out a fairly huge variety of 'brands you've never heard of' models. I know this, because

thanks to our email address having been published online since about 1998, our spam mail includes a great many offerings from Chinese factories who wonder at us, daily, if we're as excited as they are about placing an order for 10,000 devices, with our logo on them. No thanks, but thanks anyway for the intel, it's nice to know that the cost price for a 10-inch tablet is around \$35, at least the ones that aren't made with quality materials and components.

But smartwatches. What to make of them? Initially they were fancy pedometers - and indeed health is still the killer app - but that wore thin quickly as disappointment set in. Android Wear will save us all, adding true OS functionality that makes them a little more useful.

If anything, to the semi-interested observer who may be fairly certain that a smartwatch doesn't have a place in their lives (at least not yet), it's intriguing to watch the evolution in design we're seeing. A little more evolution in battery life and functionality, thanks, and we'll get there.

Power supplies, though. Who doesn't love good, clean enabling electricity? In case you weren't aware, the process of properly testing these bricks is very, very difficult to do properly.

But not for us. A couple of years ago there was a niche internet celebrity by the name of Johnny Guru, who was quite the legend when it came to power supplies. Only Johnny had the right gear and approach to tackle the task in a way that produced actually useful results. His PSU reviews were world famous, well, within a relatively small world... Johnny designed and built a custom testing rig, and his reviews were trusted more than any other.

We knew we didn't possess the proper testing equipment, so we went and introduced ourselves to Mr Guru, made him an offer for a testing rig of our own, along with training, and for the only time, as far as we are aware, Johnny agreed.

The happy result is that on the following pages is a PSU group test that we're proud of, and that you can trust.



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36



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WHAT OUR A-LIST MEANS

Our A-List award is reserved for the best products in each category we review. With a winner and an alternative pick in each, that's 92 products you know are first class.

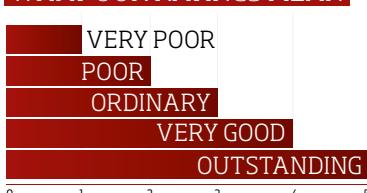


WHAT OUR AWARDS MEAN

PC & Tech Authority's comprehensive Real World testing sorts out the best products from the pack. Any product recommended by PC & Tech Authority is well above average for features, value for money and performance.



WHAT OUR RATINGS MEAN



HOW WE TEST

Our benchmarking tests are the best in the business. Read on to find how they work...

2D TESTS

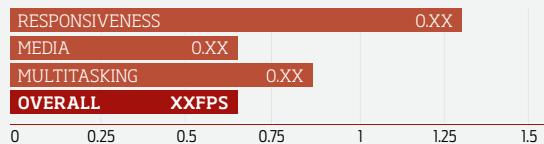
We test desktop PCs, netbooks and laptops with our own, custom-built, 2011 Real World Benchmarks.

We split the results into three categories: Responsiveness, Media and Multitasking, with the Overall score an average of the three sub-scores.

For instance, responsiveness replicates light browser and productivity workloads. The Media test involves running iTunes for audio conversion, Photoshop CS5 to crunch large images and Sony Vegas 10 to edit home video. This then gets run simultaneously alongside Cinebench 11 in order to get a handle on the multitasking ability of the system.

BENCHMARKS

3.4GHz Intel Core i7-2600K, 4GB DDR3 = 1



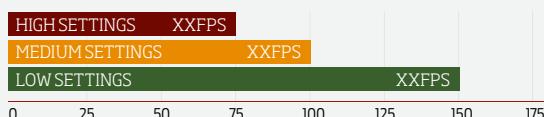
3D TESTS

We use pre-recorded demos in Crysis and DIRT 3 to test gaming performance where relevant. We have three standard test settings, depending on the power of the graphics card: Low, Medium and High.

To test gaming performance, we use our own recorded Crysis benchmark. We use the Low, Medium and High quality settings in 1366 x 768, 1600 x 900 and 1920 x 1080 screen modes respectively. Very high-end systems can also be tested using the ultra-intensive Very High settings, with all detail switched on, and varying levels of anti-aliasing enabled.

3D SPEED

■ GOOD ■ PLAYABLE ■ UNPLAYABLE



LAPTOP BATTERY LIFE

We subject laptops to two battery tests. In the light-use test, we optimise the system settings for the greatest power efficiency. We then disconnect the mains and run a script scrolling a selection of web pages until the system shuts down, giving you a realistic idea of the surfing time each laptop offers.

For the heavy-use test, we engage Windows' High Performance power profile, set the display brightness to maximum, and allow the taxing Cinebench 3D renderer to push the processor load to the limit. This gives a worst-case figure, revealing how long you can expect the battery to last under the most demanding conditions.

BATTERY LIFE

HOURS/MINUTES



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Apple iPad Air 2

THE IPAD IS THINNER, FASTER AND BETTER THAN BEFORE, MAINTAINING APPLE'S LEAD AT THE TOP OF THE TABLET TREE

Abigger screen? Nope. A lower price? Nah. How about a bit more storage in the base model? You must be joking. So what is the headline feature of the iPad Air 2? It's thinner, because that's exactly the feature everyone had been clamouring for. "You know that iPad Air? I love it, but it's just too fat."

In fairness, although it was the iPad Air 2's thinness that Apple focused on at the tablet's official unveiling, there are other changes to discover. Aside from a slimmer 6.1mm chassis (the iPad Air was 7.4mm thick), and a lighter 437g weight (down from 469g), the iPad Air 2's buttons have

been redesigned to match those on the iPhone 6 and 6 Plus; the speaker grille on the bottom edge is now a single row of larger perforations, not two; and the mute switch has been removed.

Some will mourn the loss of the latter, but we suspect most will move on quickly. It is, after all, still possible to silence the tablet by holding the Volume Down key.

The only other visual change is of the most superficial kind: for those with a penchant for bling, there's now a gold

✓ Spot the difference: the iPad Air 2 (top) now uses a single row of speaker holes

version. If this sounds like a terrible idea, never fear; the Air 2 will still be available in silver and grey versions, too.

TOUCH ID

You have to look pretty hard to see most of the functional differences between this year's Air and the last, but one of the more obvious is the introduction of Apple's Touch ID sensor, which looks and works exactly as it does on the company's smartphones. To initially register a fingerprint, you repeatedly tap your finger to the sensor in various orientations, after which the iPad can be unlocked by simply holding a finger to the sensor.

You can also use the sensor to authorise any purchases made through the App Store or iTunes, and now that iOS 8 has opened the system up to third parties, you'll soon be able to use it with other apps too. Evernote is among the early adopters – you can already use your fingerprint to sign in to the app – and we expect plenty of other developers to weigh in.

While Touch ID brings the iPad and iPhone closer together, it's worth noting that the iPad lacks near-field communication (NFC) hardware, so there's no support for touch-based payment. This is hardly a great loss, though; we can't imagine that paying via an iPad, even one as slim and light as this, would be particularly convenient.

DISPLAY

The screen was great, and its vital statistics haven't changed. It still measures 9.7in across the diagonal, and the Retina resolution of 1,536 x 2,048 delivers an identical pixel density of 264ppi. The quality remains excellent: we measured maximum brightness at 401cd/m², contrast at 1,019:1, with last year's Air attaining an almost identical 410cd/m² and 1,000:1. Colour accuracy is excellent, too, with an average Delta E of 1.82, and the screen is capable of covering 93.3% of the sRGB gamut. It's a superb tablet panel.

> There's no denying it: at 6.1mm the iPad Air 2 is an extremely slim tablet



✓ The iPad Air 2 is much faster than the previous iPad Air, and the screen is beautiful, but the base model is too expensive; more storage, please

One subtle difference between the old Air and the new is the iPad Air 2's anti-reflective coating, which gives reflections a less harsh appearance: where a light might look white when reflected in the iPad Air's screen, it looks blue here – a little like looking through a pair of sunglasses.

The LCD screen is also now fully laminated to the glass above it, just as it is on Apple's latest phones. This makes a noticeable difference both to the immediacy of the image and to perceived contrast. Graphics, text and photographs all look closer, more real on this display. Apple has also upgraded the chip that processes touch input; it's difficult to say definitively whether or not this has made an improvement, but tasks such as scrubbing accurately through a video timeline did appear to be easier.

CAMERAS

The trend for using the iPad for photos and video doesn't seem to be going away, so Apple has finally caved in and brought the iPad's camera into line with its iPhones, at least in terms of resolution. There's no

✓ A plain plastic strip houses the antenna for an upgraded 4G radio



WHAT ABOUT THE iPAD MINI 3?

Apple released the iPad mini 3 at the same time as the iPad Air 2, but it's far less interesting upgrade: aside from the Touch ID fingerprint sensor, and a new gold colour option, it's identical to last year's model. It's still a cracking compact tablet, but since the 32GB version of the iPad mini 2 (previously known as the iPad mini with Retina display) has now had a price drop to \$429, we suggest you opt for that model instead.



flash to match the iPhone 6 and 6 Plus' True Tone flash, though, nor the superfast phase-detect autofocus.

The camera is an 8-megapixel unit, with an aperture of f/2.4 and a pixel size of 1.12 microns. It produces more detailed images than its predecessor, but a close analysis of our test shots and video doesn't reveal a huge difference in quality; images are just as clean in good light, and still look a touch grainy in low light. The main and only noticeable difference is a tendency for the iPad Air 2 to overexpose images.

The Air 2's camera app does boast one significant feature that the original Air lacks: a 120fps slow-motion mode. The effect isn't quite as dramatic as it is on the iPhone 6 and 6 Plus, which have a 240fps mode, but it's fun to play with nonetheless. The front-facing camera has also seen an upgrade: it keeps the same resolution, but has a wider aperture than before. Images captured with it look just as detailed, but less bleached out.

PERFORMANCE

Internally, the iPad Air 2 brings a number of upgrades, not least a move from 1GB of RAM to 2GB. The A8X processor is new, too: it runs at up to 1.5GHz, has three physical cores and, according to Apple, is 40% faster than the A7. Meanwhile, the quad-core GPU offers a claimed 2.5x improvement in graphics speed; in our own Geekbench test, we saw a single-core score of 1,683 – a 14% improvement over the iPad Air – and a multi-core score of 4,078, 52% faster than the iPad Air.

In the real world, this makes a big difference to compute-intensive tasks. We rendered a short iMovie project out to the Camera Roll on each device at 1080p; on the iPad Air 2 it took 12 seconds, versus 17 seconds on the Air – a considerable time saving of 29%.

It should also make a difference to how much detail game developers can pack in per frame. At the time of writing, our usual GFXBench test wasn't working correctly with the Air 2, so we ran 3DMark instead. In the Ultimate test, the Air 2 returned 128fps, while the Air achieved 77fps. The Air 2's overall score of 21,741 was 40% better than the Air's 15,516.

Wireless speeds have also been boosted: the Air 2 has dual-stream 866Mbps/sec 802.11ac. 4G speeds are

faster, too, at up to 150Mbps/sec for downloads, and the 4G versions will come with an Apple SIM preinstalled, allowing users to (eventually) swap and change their carriers.

Perhaps the most impressive thing about this hugely accomplished tablet is that, despite the extra power, and a smaller battery inside, battery life has not been adversely affected. In our video-playback test, the Air 2 lasted 2hrs 46mins before expiring, a mere nine minutes short of the result the iPad Air achieved last year, and it's just as good at retaining its charge while not in use. Leave it in standby overnight and it will lose barely any battery capacity.

VERDICT

The iPad Air 2 refines what was hitherto the best tablet on the market. It's slightly thinner and lighter, with a better camera and a fingerprint reader for more convenient unlocking and app payments. It's much faster, too, and the screen is subtly improved.

Comparing specifications for available models, the original Air's 32GB option has been withdrawn: the iPad Air is now available only in 16GB, 64GB and 128GB Wi-Fi and 4G variants. We'd prefer to have seen the back of the 16GB model – it really isn't enough capacity for a tablet that has no expansion potential – but the move does mean that the 64GB and 128GB versions are now cheaper.

The iPad Air 2 is definitely the best tablet on the market right now, and rightfully replaces its predecessor on our A-List. But with prices as they are, it isn't the best value: that title goes to the original iPad Air, which Apple is now offering in its 32GB guise for only \$549.

Jonathan Bray

KEY SPECS

\$619 (16GB) • www.apple.com/au

SPECIFICATIONS

1.5GHz Apple A8X SoC • 2GB RAM • 16/64/128GB storage • 9.7in 1,536 x 2,048 IPS display • 7,340mAh battery • 802.11ac Wi-Fi • Bluetooth 4 • optional 4G • 8/1.2-megapixel rear/front cameras • 1080p video camera • iOS 8 • 1yr RTB warranty • 170 x 61 x 240mm (WDH) • 437g

OVERALL



Apple iMac 27in with Retina 5K

APPLE DOUBLES THE RESOLUTION OF ITS 27IN IMAC TO MAKE THIS THE SHARPEST-LOOKING ALL-IN-ONE IN EVERY SENSE

There's no such thing as perfection, but last year's giant-sized iMac came close. Pairing gorgeous design with potent performance, Apple's all-in-one packed a heady array of hardware in a slimmer chassis than most 27in monitors. Now it's gone 11 million pixels better.

The result has to be seen to be believed. We've never complained about a lack of detail on any 27in, 2,560 x 1,440 monitor; squeezing in four times the pixels yields jaw-dropping images. Initially, it appears as if OS X Yosemite's every icon has been laser-etched into the glass.

With new and old iMacs side by side, the difference is plain as day. Given a high-quality photograph, every wrinkle, fold and texture is laid bare. Peer closely, and the 5,120 x 2,880 resolution allows more detail to reveal itself; with last year's model, pixels swiftly squared into view. Now, you'll have to get within 16 inches to discern individual pixels.

Nor is this a case of extra pixels for the sake of it: quality

has improved dramatically. Brightness is boosted to 446cd/m², brighter than many LCD TVs, let alone monitors, and contrast has been bumped up from 904:1 to 1,197:1. Despite all this, colour accuracy hasn't suffered a jot: we measured the display as covering 99.5% of the sRGB colour gamut, while the average Delta E of 1.8 proves that the new 5K panel is just as well balanced as its predecessor.

Elsewhere, the changes are less drastic but just as welcome. The base model gets a quad-core 3.5GHz Core i5-4690 CPU – 100MHz quicker than last year's Core i5-4670 – and it joins forces with 8GB of RAM and a 1TB Fusion Drive. You can upgrade to a 4GHz Core i7 CPU and 32GB of RAM, or swap the Fusion Drive for 1TB of SSD-based storage. The sky, or rather your wallet, is the limit.

Even the base specification whipped through our benchmarks, with an excellent Overall score of 0.9. That's a little lower than last year's model, but those 11 million extra pixels on the display probably explain that.

◀ Astonishing image quality, beautiful design, good connectivity and decent performance but has no video input capability

In the Media Encoding and Multitasking elements of our benchmarks, the new iMac's faster CPU narrowly gives it the edge; in the Responsiveness section, it's 25% slower. Running our benchmarks under Windows also highlighted another thing to bear in mind: in Boot Camp the screen is scaled down to 4K, although the pixels are so small you can hardly tell.

Apple has dumped Nvidia in favour of a 2GB AMD Radeon R9 M290X GPU. Again, it's a change for the better. In our Crysis benchmark run at Full HD resolution and Very High quality settings, we saw an average frame rate of 63fps – 10% quicker than before. Bump up the resolution to 2,560 x 1,440, and there's power enough to keep Crysis running at a smooth average of 39fps. 5K gaming is beyond the M290X, however, with an average of 10fps. If gaming or GPU-compute performance is critical, you can upgrade to AMD's faster Radeon R9 M295X for \$200.

The iMac still doesn't offer the expansion potential of a desktop PC, but there's enough connectivity here for all but the most inveterate upgradeaholics. There are four USB 3 ports, an SD slot and a Gigabit Ethernet socket, plus 802.11ac and Bluetooth 4. We're also pleased that Apple has upgraded the two Thunderbolt ports to Thunderbolt 2, providing plenty of scope for adding high-speed storage and professional-class hardware. There are four SODIMM slots, too, accessible from a panel at the rear. The only loss is Target Display Mode: previous models let you connect a secondary Mac via mini-DisplayPort or Thunderbolt, but the iMac 5K doesn't support external video input.

The 5K iMac commands a daunting price, but given the pedigree of the components and hardware inside, it's not bad value; Dell's forthcoming 5K 27in monitor, for instance, is set to sell for around \$3000. For photography enthusiasts and graphics professionals looking for a stylish, powerful and colour-accurate all-in-one, there isn't a more attractive package for the money.

Sasha Muller

KEY SPECS

\$2999 • www.apple.com/au

3.5GHz Intel Core i5-4690 • 8GB DDR3 RAM • 1TB Fusion Drive • AMD Radeon R9 M290X graphics • 27in 5,120 x 2,880 display • 802.11ac Wi-Fi • Bluetooth 4 • 4 x USB 3 • 2x Thunderbolt 2 • SD card reader • Gigabit Ethernet • OS X Yosemite • 650 x 203 x 516mm (WDH)

OVERALL



Asus Transformer Book T200TA

ASUS WORKS SOME LOW-COST MAGIC AND SERVES UP A CAPABLE 11.6IN WINDOWS 8.1 HYBRID

The Transformer Book T200TA is the big brother to Asus' smash-hit 10in Transformer Book T100 convertible, expanding the display to 11.6in while keeping the price down to a mere \$649. With a quad-core Atom processor at the helm and a good-quality IPS screen, this looks to be the hybrid bargain of 2014.

At such a low price, you'd expect aesthetic compromises, but the T200TA is surprisingly handsome. The rear is finished with a fetching dark blue swirl, while the keyboard dock combines a black matte-plastic base with a silver keyboard surround.

Despite its plastic construction, the T200TA feels solid, and there's little flex in either the tablet or dock. The whole assembly is a little chunky, however. The tablet measures 12.7mm thick and weighs 781g; the keyboard dock swells the weight to 1.64kg.

Unexpectedly, part of the weight of the base is down to a replaceable 2.5in 500GB hard drive, which supplements the tablet's modest 32GB of flash storage. It's great to have that kind of storage on hand – although the tablet must be docked in order to access it.

The tablet has decent connectivity options. There's dual-band 802.11n Wi-Fi and Bluetooth 4, as well as micro-HDMI and micro-USB ports, plus a microSD slot to supplement the tablet's built-in storage. It's worth investing in a card, as the OS and recovery partition swallow most of the 32GB drive – we were left with around

8GB free before we'd even installed our benchmarks.

The dock, meanwhile, adds a full-sized USB 2 port, one USB 3 port and Gigabit Ethernet, and the keyboard and touchpad are a good size – although the keys are rather limp.

The T200TA has a 5-megapixel rear-facing snapper and a 2-megapixel front camera. The rear camera dredges up enough detail for social networks and the like, but our test shots were dogged with noise and ugly compression artefacts.

The 11.6in display has a low resolution of 1,366 x 768, but Asus has invested where it counts: a good-quality IPS panel. Although brightness tops out at a modest 215cd/m², a contrast ratio of 836:1 gives images plenty of detail, from the darkest shadows to the brightest highlights, and viewing angles are wide too. If we had to make a criticism, we'd note that the panel fails to reproduce the richest, most saturated colours, since it covers only 63.9% of the sRGB colour gamut, but overall it's still an attractive display to use.

With one of Intel's quad-core Bay Trail CPUs powering the whole show, the T200TA feels spritely most of the time, and an Overall score of 0.37 in our Real World Benchmarks reflects more than enough poke for everyday office

▼ A fantastic screen for the price, and plenty of storage, although with only an Atom processor and 2GB of RAM, it's for lightweight computing only



▲ The keyboard dock offers decently sized keys and a generous touchpad

and internet applications. However, if you were hoping to use that 11.6in screen for multitasking, you may be disappointed. Asus has trimmed costs by partnering a 32-bit installation of Windows 8.1 with a frugal 2GB of RAM, and there's no way to add extra memory. As a result, the system can easily get bogged down, resulting in performance that's sluggish even by Atom CPU standards.

On the upside, battery life is as good as you'd expect for an Atom-powered device. With the screen dimmed to 75cd/m² and Wi-Fi turned off, the T200TA flicked through a variety of web pages and documents for 10hrs 40mins before needing a trip back to the mains. Unlike the T100, the T200TA charges only via the supplied mains charger – charging over USB isn't supported.

At this price, we never expected the T200TA to be the last word in ergonomic design, but it's a great little hybrid that does a cracking impression of a budget 11.6in laptop, and doesn't make a bad tablet either. The display in particular is significantly better than the screens you'll find on most budget laptops. The Atom processor and 2GB of RAM may not provide enough headroom for everyone's needs, but as a cheap and versatile Windows device, the Asus Transformer Book T200TA takes some beating.

Sasha Muller

BATTERY LIFE



KEY SPECS

\$649 (11.6in) • www.asus.com.au
Z3775 quad-core Intel Atom CPU • 2GB RAM • 64GB SSD • 11.6in screen • Wi-Fi • keyboard dock • Windows 8.1

OVERALL



Sony Xperia Z3 Compact

SONY'S PINT-SIZED SMARTPHONE PACKS IN A HOST OF PREMIUM FEATURES WITHOUT THE HIGH-END PRICE

Sony's Xperia Z1 Compact was one of our favourite phones of early 2014, squeezing big performance into a lightweight, water-resistant chassis. Now the range continues in the same vein with the Sony Xperia Z3 Compact.

It's endearingly petite compared to modern flagship phones, with a screen that measures 4.6in across the diagonal helping to make for a very pocketable handset. Design-wise it's reasonably attractive, too, with curved edges clad in translucent plastic, a glossy flat back and "shatterproof glass" up front. The Z3's sturdy-feeling body isn't the slimmest out there – it measures a chunky 8.7mm thick – but despite a screen that's only the tiniest bit smaller than Apple's iPhone 6, the Z3 feels markedly more compact (it's actually 11mm shorter), and it's just as light, weighing 129g.

We weren't particularly keen on the slightly unpleasant green colour of our review unit, but the good news is that you can also buy it in much more palatable shades of red, black and white. And the design is more than just distinctive – it's also seriously tough. A pair of flaps on the left edge seals the ports, giving the Z3 its IP68 water- and dust-resistant rating, and as with other high-end Xperia devices, you can dunk the Z3 Compact in up to a metre of water for 30 minutes. This is a phone that can easily shrug off rain showers, sweat and accidental tea spillages, and soldier on.

Beneath those flaps, there's a decent level of connectivity, too: the upper flap covers the phone's micro-USB port and microSD slot, which allows up to 128GB of extra storage to be added; the other conceals the handset's nano-SIM tray. In general it's an excellent, no-nonsense design: light, robust, pocketable and usable one-handed. There's even a dedicated camera button, making it simple to fire off quick snaps.



FEATURES AND SPECIFICATIONS

The Z3 Compact matches its sensible design with a raft of top-of-the-line features and components. Where most smaller smartphones sacrifice performance, the Z3 Compact makes no such compromise, matching its bigger brother, the 5.2in Xperia Z3, blow for blow.

The processor is a quad-core 2.5GHz Qualcomm Snapdragon 801, as fast as you'll find in any Android phone currently, which is coupled with 3GB of RAM, an Adreno 330 GPU and 16GB or 32GB of included storage.

The rear camera's 1/2.3in sensor captures 20.7-megapixel stills and 4K video at 30fps (1080p is shot at 60fps), and there's a 1/8th speed slow-motion mode to match the iPhone 6.

Elsewhere, the Z3 Compact has most other bases covered as well. There's Cat4 4G support for downloads of up to 150Mbps/sec, Bluetooth 4, NFC and dual-band 802.11ac Wi-Fi. Even the battery is big: Sony has squeezed in a 2,600mAh unit – a remarkable feat in a phone so small.

A screen resolution of 720 x 1,280 isn't a match for larger rivals, which tend to have Full HD displays or higher. Due to its smaller size, though, the pixel density is perfectly respectable. Its 319ppi delivers onscreen images that look just as sharp as they do on the iPhone 6 (327ppi).

There are some areas in which the Z3 Compact lags behind the very best, but fortunately these aren't critical. It has no infrared transmitter, no heart-rate monitor, no fingerprint reader, and the camera doesn't have phase-detect autofocus, using only the slower contrast-detect AF method.

PERFORMANCE

The upshot of squeezing such powerful hardware into a compact, 720p phone is that it performs like a rocket. In the most demanding of the benchmarks we run on phones – the GFXBench T-Rex HD gaming test – the Z3 Compact delivered a frame rate of 41.2fps, slightly faster than the Samsung Galaxy Alpha. Only the iPhone 6 and 6 Plus are significantly quicker.

Its browser results were less than stellar, with 825ms in SunSpider and 913 in Peacekeeper, but scores of 927 and 2,602 in the single- and multi-core parts of the CPU-focused Geekbench 3 test were superb, and equal to most Android challengers. Once again, though, both iPhones beat it.



▲ A fantastic screen, decent battery life and good all-round performance. We don't like it in green; otherwise, nothing negative of note

In real-world use, the phone felt perfectly slick in most departments. The only problem we encountered was a slight pause when opening the camera app and some of the more graphics-heavy apps.

The screen performs brilliantly. It's blazingly bright at its maximum setting: we measured it at 550cd/m², which means it's readable on even the brightest days. Even with Sony's "X-Reality" and "Super-vivid" image enhancements turned off, contrast is a highly respectable 966:1, lending movies, games and photos plenty of solidity and depth. With good colour accuracy and the ability to cover 97.5% of the sRGB colour gamut, the Sony Z3 Compact's display is as good as any we've come across on a phone.

We have no complaints over call quality either. Most calls we made came through loud and clear at both ends. We had no issues with dropped calls either, and the speaker reaches loud enough volumes that you can listen to talk radio and YouTube

videos without having to connect to an external speaker.

The camera is also fantastic. Slightly over-aggressive compression does smear details in good light, and the autofocus isn't the quickest – it hunts back and forth more than the cameras on the iPhone 6 or the Samsung Galaxy S5. However, for overall quality in low light (without the flash), it beats both, with a cleaner, more detailed image. Plus, it's fun using the various modes, in particular the aforementioned slow motion, and quality in video is top-notch.

Perhaps more importantly, battery life is excellent. In our time with the phone, its 2,600mAh power pack reliably delivered more than 24 hours of mixed use. It also performed well in our tests, depleting at a rate of 7.5% per hour while playing 720p video (in flight mode with the screen set to a brightness of 120cd/m²), and at a rate of 3.3% per hour while streaming audio over a 3G connection with the screen switched off.

If we're being picky, the Z3 Compact does fall slightly behind the very best here: its predecessor,



the Z1 Compact, was more frugal – using 5.4% and 2.7% per hour in the video and streaming tests – as were the HTC One M8 (6.5% and 3.8%) and the iPhone 6 (7.5% and 1.7%). There isn't a huge amount in it, though, and when battery life is really low, the Z3 Compact's Stamina mode can help eke things out for a little longer.

SOFTWARE

Finally, as with its other Android devices, Sony installs its own skin on top of Android 4.4.4 (KitKat), and there's much to like. The most notable difference from plain Android is the way that the app drawer works: Sony adds the ability to reorder apps or have them displayed alphabetically, and uninstalling apps is different, too: the "long-press and drag" method has oddly been removed.

We like the extra, customisable shortcut menu that Sony has added to the bottom of the multitasking view. Largely, though, we appreciate that Sony's customisations are unobtrusive and subtle. For the most part, the Z3 Compact behaves like a standard Android phone, and that's a very good thing.

VERDICT

The Xperia Z3 Compact can't quite match the very best smartphones we've seen over the past year when it comes to all-round performance, but then it doesn't need to. Why? First, if you want flagship performance and features in a smaller package, it's currently your only option other than the iPhone 6. Second, its \$699 SIM-free price undercuts all of its larger-screened rivals by a huge margin.

It deserves to take the prime spot in our A-List. The Sony Xperia Z3 Compact may be a little smaller than the HTC M8, and its A-list predecessor the Google Nexus 5, but it's more manageable, superior to the Nexus 5 in all other departments. In short, no other smartphone offers the same level of performance and features at this price.

Jonathan Bray

KEY SPECS

\$699 • www.sony.com.au
2.5GHz Qualcomm Snapdragon 801 SoC • 2GB RAM • 16GB storage • Adreno 330 graphics • 4.6in 720 x 1,280 IPS display • 2,600mAh battery • 802.11ac Wi-Fi • Bluetooth 4 • 20.7/2.2-megapixel rear/front cameras • Android 4.4.4 • 1yr RTB warranty • 65 x 8.7 x 127mm (WDH) | 129g

OVERALL



Ranked in
the *top 1%*
of the world's
universities, an
IT degree from
Monash can
take you further.



MONASH University

infotech.monash.edu

D-Link Viper DSL-2900AL Dual Band AC1900 Modem Router

CAN D-LINK'S NEW HIGH END MODEM ROUTER STAND UP TO THE CURRENT COMPETITION?

Taking its design from D-Link's well received DIR-868L router, the DSL-2900AL is a refreshing entry to the market for those who are interested in a more subtle, space efficient modem router. Internalising all of its antennas and putting its connections on the back spine of the cylindrical build, the simple black design sits stealthily on a shelf with only a small line of network lights visible from the front. Inside the D-Link Viper is running an AC1900 speed dividing up into N600 and AC1300 dual band connections, driving its signal across 6 MIMO antennas using Advanced AC SmartBeam technology to offer not only strong and reliable connection, but increased stability at longer distances. The lack of physical aerials doesn't hinder the Viper at all, managing to maintain a decent 85.1 Mb/s when tested over its 802.11ac network, maintaining solid speeds even in concrete-walled environments.

The DSL-2900AL has four Gigabit ports with one WAN input for NBN customers. It has a USB 3.0 and a USB 2.0 port for file sharing, with support via its interface for access remotely when on the move. This is all accessible via a browser-based interface, also offering printer sharing for those who need it, network diagnostics and the ability to control access over connected clients including parental restrictions.

Unfortunately, outside of these expected settings, the Viper feels a little vanilla compared to some of its competitors, falling behind the curve as far as smart networking devices go with no unique onboard applications or virus protection on offer. However, the Viper offers great performance and fast speeds that stand up admirably to its competition, with some added points for style, and in a form factor that's unique.

Josh Philpott



KEY SPECS

\$379 · www.dlink.com.au
USB 2.0 / 3.0 sharing ports · 6 MIMO Internal Antennas · Advanced AC SmartBeam · Mobile apps

OVERALL



Acer Chromebook 13

SOLID PERFORMANCE AND BATTERY LIFE MAKE THIS CHROMEBOOK A VERY SOLID CHOICE FOR MOBILE MAVENS

There's a party going on and its name is Chromebook. Acer's newest entry comes via the Chromebook 13 – a 13-inch portable that ticks a lot of boxes and won't leave standing on the wall, idly by, at the Chromebook party.

The Chromebook 13's body felt solid. Weighing in at 1.5kg, it's well made with a solid feel. The plastic body is textured on the base so it's not slippery if you're carrying it without a case. The chiclet keyboard is comfortable to use and the large trackpad was accurate and responsive.

Running Nvidia's Tegra K1 processor and 4GB of DDR3L memory, our first impression was that the Acer's entry into the Chromebook market is very solid. Performance was excellent. We watched full screen streaming video in high definition on the 1920 by 1080 with no lag.

Other tasks such as working with files stored in our Google Drive were painless. The wireless connection was delivered with 802.11ac, which we're pleased to see included in the features.

Local storage is limited to the in-built 32GB SSD although connecting external storage devices via the two USB 3.0 ports was a snap. One port is on the left side of the device with the second at the back, adjacent to the HDMI port so you can hook the Chromebook 13 up to a TV, projector or to an external display, if you like.

On the right side of the body, there's a 3.5mm headphone jack that sits next to the power input. The design of the power connector was a concern. The plug is very thin and there were times when we lifted and moved the Chromebook 13 only to find the L-shaped connector had turned slightly. As a result, when we put the computer down, we felt that we were going to either snap the connector or damage the socket.

Battery life was great. We were able to watch a full length feature movie with the sound piped through to a set of Bluetooth headphones with enough juice left in the 3220 mAh battery for a couple of hours of work and web browsing.



In a market that is getting more and more cluttered by the day, Acer's Chromebook 13 is a solid device with great performance that will suit the needs of most mobile users, provided the Chrome OS is to their liking or meets their needs.

Anthony Caruana

KEY SPECS

\$479 · www.acer.com.au
Nvidia Tegra K1 2.1GHz CPU · 13-inch 1920 x 1080 display · 2GB DDR3 RAM · 16GB SSD · 802.11ac Wi-Fi

OVERALL



Acer Aspire V Nitro 15

IF BATTERY LIFE AND SCREEN RESOLUTION WERE BUMPED UP, ACER'S NITRO V 15 WOULD MAKE THE LEAP FROM SOLID TO BRILLIANT.

The word "nitro" is meant to invoke images of explosive performance, like when Mad Max guns his Interceptor. Equipped with a powerful Core i7 engine clocked at 2.50GHz, a healthy 16GB of DDR3L SDRAM and a 1TB hard drive, Acer's Aspire V Nitro 15 promises plenty of bang for buck.

The Black Edition Aspire V Nitro 15 we tested was a very snappy performer although we'd suggest running through all the extra software that comes preinstalled. We found that basic tasks, like opening a File Explorer window took a few seconds after start up because of all the extra software loading in the background. However, that did eventually pass when we were a little more patient about letting it boot fully.

Acer is pitching the Aspire V Nitro 15 as a gaming notebook although we think it would make a great workhorse as well. The matte black casing looks elegant and at 2.4kg it's quite portable for a 15-inch notebook. Connectivity is covered by

three USB 3 ports, HDMI, 3.5mm audio and a gigabit Ethernet jack.

The keyboard, complete with a full number pad on the right side, is comfortable to use although the red backlighting has only two settings -- on and off. Some control over brightness would be a nice addition. The trackpad is quite large although we did find it a little soft. For example, when right clicking using the bottom right corner of the trackpad, there was quite a lot of flexing movement.

The 15.6-inch non-touchscreen display running at 1920 x 1080 did a solid job of displaying high definition video although we expected better. At this size, we'd have though Acer would have delivered a higher resolution display at this price range. However, sound quality from the inbuilt speakers was excellent, making the Aspire V Nitro 15 great for watching movies and gaming.

Battery life, driven by a 4605 mAh Li-ion powerplant, was solid. Streaming



▲ She's quite the looker

full screen video over the 802.11n Wi-Fi delivered a respectable but unspectacular three and half hours between trips to an outlet.

Anthony Caruana

KEY SPECS

\$1999 · www.acer.com.au
Core i7 4710HQ · 15.6-inch FHD screen · 16GB DDR3 RAM ·
1TB hard drive · Nvidia GeForce 860M 2GB GPU

OVERALL



LG 34UC97

IS VERY WIDE AND SLIGHTLY CURVED THE NEW WAY AHEAD?

Ultra wide screen monitors take up a rather intimidating amount of desk real estate thanks to the 21:9 aspect ratio and the 34UC97 is definitely no exception. It's a whopper of a thing, measuring just over 83cm wide and 47cm tall, but with great desk space comes great screen size. The bright 3440x1440 IPS screen is a beauty featuring high pixel density for extremely crisp images and is also slightly curved, making looking from one side of the screen to the other feel a little more natural than



some of the flat ultra wide monitors on the market. The matte anti-glare finish is also a welcome feature, as there's more than enough surface to catch the light.

The size and image clarity of the monitor are impressive, but its usefulness is definitely situational for most users. It's wide enough that you can have three full size applications open next to each other – an email client, word and web browser for instance – but that alone doesn't really recommend it over similarly sized but cheaper 16:10 monitors.

For applications that require a good number of toolbars, such as desktop publishing, design, Autocad or financial analysis, the extra screen width could definitely be invaluable. When it comes to gaming, the ultra-wide format is something of a hit and miss scenario. Some games can run natively in 21:9, but the vast majority need third party programs or mods to run in the correct aspect ratio, and even then it can cause some

interesting distortion as the engines try and render images in a ratio they are not created for.

There are some curious design choices with the 34UC97, such as having all the cabling, ports and the on/off switch hidden behind a not particularly accessible flap obscured by the stand, but for the most it's a well-designed, slightly austere but otherwise attractive piece of kit. If you have a need for extra horizontal screen space, you could do a hell of a lot worse than the 34UC97, but if you're a more casual computer user or a gamer who couldn't be bothered modding each new title to work in the correct aspect ratio, stick with 16:9.

Dan Wilks

KEY SPECS

\$1799 · www.lg.com.au
21:9 curved QHD · IPS Display · SRGB over 99% ·
Thunderbolt / Mac compatible · 3440x1440 IPS screen

OVERALL



Apps round-up

ANTHONY CARUANA WITH THE WISE WORD ON THE ESSENTIAL APPS, TOOLS AND UTILITIES WE THINK YOU NEED.

Wiper

Privacy is probably one of the hot button issues for app users. Between government moves to access our metadata and the potential for law enforcement and other agencies to snoop on our communications, there's little wonder we're looking for ways to keep our private lives private. Wiper offers encrypted messaging and calls over Wi-Fi to your friends.

Installation was a breeze. Once we provided our email address and mobile number, we received a code via email to complete account set up. From there it was just a matter of following the prompts. The app did ask for address book access so we could invite friends to use Wiper – but it doesn't automatically start inviting anyone without your permission.

With Wiper, you can make calls, send messages and share content. It's similar to services like Snapchat where messages disappear after a short time but with Wiper you can control when the message disappears. Once a conversation is finished with, just tap the Wipe button and the

messages instantly disappear from both sides of the conversation.

A little plus we like is that shoulder surfers won't know who you're chatting with as the other party's name is hidden.

We made calls and exchanged text messages using Wiper and it worked perfectly over Wi-Fi. It also works of cellular networks but watch out for the data charges if you're on a limited plan as the service does use HD quality sound.

One of the things that is important in a private messaging app is, or course, encryption. Wiper's developers are somewhat evasive about what encryption they use other than to say it was on a par with other secure messaging apps.

One of the features we really liked was the YouTube integration. We were able to search for a video and share it directly from within Wiper. Just search, hit the share button and you're done.

Whether all that is enough to compete with myriad other messaging apps is hard to tell but Wiper is a competent app that delivers on its promise.



\$Free • Wiper Inc • iOS, Android

OVERALL



Fitocracy

Read through most business-focussed IT magazines or websites and a few words will pop out, off almost every page. Big data, gamification and social are significant trends influencing enterprise IT. But they're also big news in the personal fitness and well-being world.

Fitocracy is an app that forms the mobile component of a popular online service. The app delivers all of the same functionality as the browser-based service but it's optimised for smartphones.

There are two main elements in Fitocracy. One is the social side. It's similar to Facebook in that you can post your status, share links, photos and videos and send direct messages to other members. There are groups for discussing topics of interest. It's not just limited to health and fitness. Some of the content can get a little racy although there are community guidelines about nudity that are enforced.

The other side of Fitocracy is focussed is around exercising. There's an exhaustive exercise library so you can log workouts.

Adding sets, weights and other notes is very easy as there are custom input panels that make the task easy – an important consideration if you're logging something and your hands are shaking after exerting yourself. Once a workout is completed, it's shared on your timeline where others can leave encouraging comments or "props" – the equivalent of a Facebook like.

The gamification angle comes in as workouts are allocated points based on the effort. The exact algorithm for allocating points is proprietary and part of Fitocracy's secret sauce but it seems to be based on a number of factors including your past performance, the weight you lift, the number of reps and other factors.

Cardio-vascular exercises such as running a cycling can also be logged and receive points. As you accumulate points, you can level up with higher levels requiring more effort.

If you're looking for some extra motivation and a way of tracking your workout progress, Fitocracy might just be what you're looking for.



\$Free • Fitocracy • iOS, Android

OVERALL



Pocket Weather

There are lots of apps that take data from the Australian Bureau of Meteorology and repackage it but our favourite is Pocket Weather. It's attractive, easy to use and puts a wealth of information just a tap or swipe away.

When you launch the app, it automatically checks your location and gives you the local weather but you can also configure it to show the weather in other locations. For example, we keep tabs on many local capitals for when we travel.

As well as the current weather and forecasts, Pocket Weather delivers tidal information, predicted rainfall, UV, wind speed and direction, and radar maps.

Adding cities to your tracking list is easy. Your current location automatically shuffles to the top of the list. Our only complaint is that it doesn't talk to overseas services so international travellers will need to find one that works across different countries.

\$2.49 • ShiftyJelly Pty Ltd • iOS

OVERALL



Hello

Keeping track of contacts can be a challenging task. Think of all the business cards you collect over the course of a year. We'll bet that when you look back through the pile a few months later you'll be hard-pressed remembering where you met all those people.

Hello is part of the Evernote suite of apps. Its purpose is to pull together contact information, your location and calendar data so that you have a complete record of how, where and when you met.

The iOS version lets you take a photo of a business card that is automatically given the OCR treatment. The data is synced straight to the address book and the contact is automatically found in LinkedIn if they have an account. This allows you to connect with them and to send your contact information in just a few seconds. Android skips OCR capability but is otherwise identical.

\$Free • Evernote • iOS, Android

OVERALL



TripIt

Travelling for work sounds like fun until you've done it a few times. Then it becomes a complex management task of hotels, airports, transfers and meetings. TripIt pulls all that information together to create an electronic itinerary.

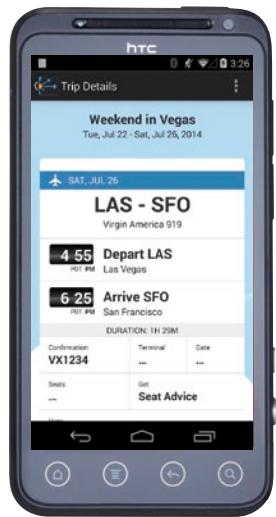
While that sounds easy, TripIt's real smarts come from its capacity to either automatically scan your inbox, if you give it permission, or receive travel plans by email. It then reads the important information such as flight numbers and times, accommodation check-in dates and booking references and pulls them together.

When the next phase of your trip is imminent, TripIt will alert you. There's even a "check-in" button so you can check into flights online from within the app.

There's also a browser interface so you can access your TripIt data from your PC or Mac.

\$Free • Concur • iOS, Android, Windows Phone, BlackBerry

OVERALL



Photosynth

3D panorama shots used to be really hard work. Photosynth makes the task a snap. It automatically detects when to take pictures of a large scene as you pan your camera around. Unlike the panorama feature of most cameras, it's not merely limited to movement in one plane.

We used Photosynth in the world's most famous gallery, Le Louvre, to shoot images of entire rooms from floor to ceiling. The app was able to stitch all the pieces together and assemble them, creating a 3D panorama. You can use it when walking around a statue or creating a photo of a person – as the US CBS network did when they asked viewers to submit images of Barack Obama that they used to create their own model of the President.

If you're looking for a tool to capture difficult scenes or for 3D models Photosynth is easy to use and delivers great results.



\$Free • Microsoft • iOS, Windows Phone

OVERALL



Labs Briefs

Bauhn Sphere smartphone

\$279 · www.aldi.com.au

Bauhn is sold exclusively through Aldi, and we did ask if it was an in-house brand, to which we received no reply. In any case, just a couple of weeks ago this 5-inch budget phone looked like a reasonable deal for one this size.

Then the Huawei Ascend Y550 came along, at \$99 for 4.5-inches of similarly-specced smartphone. In its favour, the Bauhn is slim and light and feels good in the hand. The near-raw Android runs well enough on the quad-core 1.3GHz CPU, but the camera is a shocker, the worst we've seen on a smartphone from this decade. Shutter lag is treacle-slow and image noise is enough to make a shot of magazine text shot a foot away in bright light unreadable. The 8MP sensor produces results far below expectations. If the camera isn't a priority it's an adequate performer and anyone who buys one is unlikely to have serious issues, but stacked up against the Huawei it can't compete.

Ben Mansill

OVERALL



Seagate Wireless Plus 2TB

\$279 · www.seagate.com

With 2TB of storage capacity in a relatively small form factor, Seagate's Wireless Plus Mobile Storage drive adds in Wi-Fi sharing and media streaming via the 2.4GHz hotspot it creates. Up to eight connected devices are supported, although you will see optimum performance when streaming HD using around half that number. A factor to consider, depending on your possible usage plans, is that file transfers over Wi-Fi to the drive aren't supported; you need to use the USB 3 cable to load and unload files.

A password can be added for security. Streaming to a mobile device requires a free app from Seagate be installed. The drive doesn't require a separate AC power source, as it uses the USB connection to power the drive.

Ben Mansill

OVERALL



Sandisk Ultra II SSD

\$119 · www.sandisk.com.au

The Ultra is a budget SSD from Sandisk, and in its latest guise has certainly delivered value. A street price of around \$120 for the 240GB model sets it as just about the cheapest SSD of that capacity in Australia. Even Crucial's new value M100 can't compete, at around \$20 more for a similar capacity.

To pull off that low price Sandisk used Triple Level Cell (TLC) memory chips for the first time, which have a theoretically shorter write endurance. SSDs – and TLC-types, in particular, haven't been around long enough to see that in real world experience, but Sandisk does offer a 3 year warranty, so that's some peace of mind, and Samsung uses TLC NAND in its star performer, the Evo 840, as another vote of confidence.

Performance will be a little slower than non-TLC SSD, but still vastly better than a hard drive, so at the price this would be a good choice for a budget upgrade.

Ben Mansill

OVERALL



Turtle Beach Recon 320

\$89 · www.turtlebeach.com

These are just as comfortable as the Turtle Beach Earforce Z60 headphones, and despite being much cheaper, sound better. Bass is the big winner, with a good thickness and definition. It's a little boomy, as a result of the spacious echoey sound imparted across the spectrum that is characteristic of these cans in general. That hurts music a little, depending on what you're listening to (hip hop is fantastic, wall of sound guitar less so), but for games it all makes for a nicely volumetric soundscape. Midrange is a little weak, but again, that's something you hear with most gaming headsets. Connection is via USB, and its integrated sound 'card'.

It's noteworthy that these are built around a 50mm driver, while the Z60's have a 60mm driver, yet these sound better with a fuller more detailed sound. Sound leakage is significant, despite the full over-ear design.

Ben Mansill

OVERALL



Huawei Ascend Y550

\$99 · www.huawei.com.au

A\$99 smartphone really should be a whole lot worse than this. Huawei's Ascend Y550 doesn't look or feel 'cheap', unless it's sitting next to one of the aluminium premium devices. It sports a quad-core Cortex A53 1.2GHz CPU, with a 480 x 854 screen, upon which things are ever so slightly blurry, but only compared to the very highest standards set by new 1080 screens. In operation it's perfectly responsive with no lag or delay. The 5MP camera is good enough, and is a lot better than the Bauhn Sphere's 8MP job. Panning around, it's as smooth as the best, while the Bauhn can't keep up with camera movements. The bad news is that there's only 4GB of storage onboard, with a mere 1.38GB available in our test unit out of the box. There's a microSD slot so you can improve that situation. Or not, if you're the type who never loads up a phone with media or apps then this is a proper little wonder for the price.

Ben Mansill

OVERALL



Rapoo V500

\$79 · www.rapoo.com

We really want to like Rapoo's first effort at a gaming keyboard, and the V500 certainly looks the part. With a bright orange metal plate keeping the body sturdy, and stylised, blocky characters on the keys, it's a bold statement.

In practice however, the keyboard is a bit of a letdown. Rapoo has eschewed the ever popular Cherry mechanical keys in favour of 'Yellow' switches from Kailh. Unfortunately the key action is an uncomfortable mix of shallow travel and muddy feedback. On top of that, the metal plate gives out a hollow ringing sound during typing, and can be really annoying while gaming. Plus, our review unit didn't quite sit flat on the desk, giving the keyboard a slight rocking motion as typed and gamed.

If you're looking for a mechanical keyboard on a budget, the V500 may suffice, but we really would recommend sticking with Cherry switches.

David Hollingworth

OVERALL



Magellan Echo fit watch

\$129 · www.magellangps.com.au

As a stand-alone fitness watch, the Echo Fit is comfortable, light and has a battery life of 6-12 months. The pedometer proved to be inaccurate, off by 1km over the course of a 5.5Km run. To get the most out of this you will need to pair it with a smartphone and the optional extra heart rate monitor (\$50). In testing it works very well with fitness apps like Strava, Wahoo and Map My Run.

Overall you need to add too many extras to extract maximum functionality, when the Jabra Pulse headphones, which we reviewed last month, does it all, and gives you a quality set of music buds in the bargain.

In the end, it does what it says on the box, but it just doesn't impress, or offer anything that other similar products do. Perhaps as a simple watch, of the sporty variety, it's acceptable to people who only don't need extensive features.

Tim Frawley

OVERALL



Turtle Beach Earforce Z60

\$260 · www.turtlebeach.com

These wireless gamer cans are comfortable, but the audio itself, though, is a little bit disappointing – at least compared to the cheaper Turtle Beach Recon 320 headsets on the facing page. These ones have DTS, the Recon 320's don't, but oddly the Earforce Z60's have noticeably thinner bass, actually among the least-bassy gaming headphones I've ever tried. Conversely, though, the top end is sharp and very well defined. Mids are thin, typical of gaming headsets.

The in-line control has a switch to cycle through EQ pre-sets for games, movies, music and a setting for no processing, which I thought was the best for games anyway. These aren't much use for music due to the lopsided balance and lack of bass. As gaming cans, they've unlikely to disappoint.

Ben Mansill



OVERALL





GROUP TEST Power supplies

THE PSU IS NOT A COMPONENT THAT'S OFTEN SCRUTINISED, YET IS ONE THAT'S CRITICALLY IMPORTANT. OUR LABS INCLUDES ONE OF THE MOST SOPHISTICATED PSU TESTING RIGS IN THE WORLD, WE SET **BENNETT RING** UPON THE TASK.

The humble Power Supply Unit (PSU) is the red-headed step child of PC components. While the glory-hogging GPU and crowd-pleasing CPU get all the love, this crucial box of electrical goodness is often last on the list when building a new PC. Yet scrimping on the PSU can bring even the mightiest PC to its knees, causing instability and even damage to the system, but choosing the right one can be just as confusing as picking any other component. How powerful does the PSU need to be for a given PC build? What's with the different efficiency ratings? And what separates a high quality PSU from a cheap and cheerful model that'll probably blow at the first sign of trouble? We're here to answer those questions, with the aid of the best benchmarking gear in the business.

WHAT'S WITH THE WATTS?

Each PSU is rated by the number of Watts it outputs, with entry level units starting around 400W. Enthusiast PSUs now pump out up to an extraordinary 1500W of power, but that's overkill for all but

the most extreme systems. Figuring out exactly how much power a PC requires isn't easy, as every single component has its own thirst for power. However, generally speaking the overall power

requirement comes down to the CPU and GPU, the two components that draw the most electricity from the PSU. Nvidia and AMD both list the recommended PSU strength for every graphics card they sell,

	BUDGET	GAMING	BEHEMOTH
CPU type?	AMD A10 7800	Intel Core i7-4770K	Intel Core i7-4790K
Overclocked?	No	No	Yes – 4.5GHz with 1.3V vcore
Water cooling?	No	No	Corsair H100
Graphics Cards?	Integrated	GeForce GTX 970	2 x GeForce GTX 980
# of Hard Drives?	1x HDD	1x HDD, 1x SSD	1x HDD, 3x SSD
Amount of RAM?	1x 4GB	2x 4GB	4x 4GB
Blu-ray Drive?	Yes	Yes	Yes
# of USB Devices?	Four	Six	Eight
# of Case Fans?	Two 80mm	Three 80mm	Four 120mm
TOTAL WATTAGE	206W	361W	668W
RECOMMENDED PSU	350W	450W	750W



▲ While really just a mundane component, some effort has been made to make them look nice

a handy starting point assuming your machine isn't overloaded with dozens of hard drives or multiple water coolers.

Another excellent place to start is the popular PSU Calculator found at <http://extreme.outervision.com/psucalculatorlite.jsp>. Using this calculator, we were able to determine the PSU requirements for three generic types of PCs; a budget desktop, a basic gaming machine and an overclocked behemoth running multiple-GPUs with water cooling.

These values are based on the exact system specs of each PC, but in the



HOW WE TEST

We have to thank Jon Gerow at Corsair, and formerly of Jonny Guru fame, for his assistance in testing the PSUs. Thanks to his recommendation we purchased a SunMoon SM-5500ATE load testing device, which is a huge slab of benchmarking hardware that looks like it was ripped out of a 1970's NASA command centre. When used in conjunction with an Oscilloscope, this enabled us to test PSUs far more accurately than simply plugging them into a PC and watching the voltage values.

We measured two values with the load tester, first and foremost being voltage regulation. This examines how precisely each PSU supplies the four different voltages required by a PC, in the form of a +12V, 5V Standby, +3.3V and +5V signal. The more closely matched the voltage is to these values, the more stable the system will be, as the motherboard and other devices don't have to deal with fluctuating power values. A good PSU will deliver these voltages with a minimum of variation, especially at higher loads. The second measurement that we examined is the ripple of each voltage, which measures the difference between the peaks and troughs of each power signal. A high ripple places extra load on the power filtering sections of each component, making low ripple desirable. Like voltage regulation, ripple tends to get worse as more load is placed on the PSU.

Unfortunately we don't have the space to list all of the results of these benchmarks, so we've decided to display the voltage regulation tests, and will summarise the ripple results in the body of each PSU review. We also took into account the price and features of each PSU when determining the overall score. Read on to see which PSUs are worthy of powering your beloved rig, and which would make for a good door stop.

case of the Gaming machine Nvidia's recommended PSU for the GeForce GTX 970 is a 500W model. As a result, we'd suggest sticking with the GPU manufacturer's recommendation first, then falling back on the PSU calculator second. Even then, it's always better to add an extra 100W to the values listed by the calculator to provide capacity for extra accessories and components in the future.

MODULAR VS SEMI-MODULAR VS CABLED

PSUs are often referred to as modular or semi-modular, but what does that mean? Easy – a modular PSU has no cables

◀ Modular cables are attached only as needed, reducing clutter and improving air flow

attached to the box. Instead the user selects the necessary power cables for their system and attaches them to the PSU. This helps to cut down on cable clutter immensely. A semi-modular PSU has the most commonly used cables permanently attached to the PSU, such as the 24 pin connector, along with ports to attach extra cables depending on the user's needs. Finally, cabled PSUs have their power cables permanently attached to the PSU, and these are the cheapest.

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EFFICIENCY EXPLAINED

Today's PSUs include an efficiency rating, which is known as the 80 Plus standard. This measures the incoming Wattage from the wall socket versus the Wattage being delivered to the PC, and there are various levels of efficiency, as described in this handy table. The higher the efficiency, the less energy wasted, which is worth noting if you want to keep your power bill low.

80 PLUS TEST TYPE				
PSU Load	10%	20%	50%	100%
80 Plus		80%	80%	80%
80 Plus Bronze		82%	85%	82%
80 Plus Silver		85%	88%	85%
80 Plus Gold		87%	90%	87%
80 Plus Platinum		90%	92%	89%
80 Plus Titanium	90%	92%	94%	90%

Antec High Current Pro Platinum 1300W

Built for the most extreme power requirements, this 1300 Watt heavyweight has plenty of juice to drive even the most demanding system. However, it's got a colossus price tag to match, even when compared against similarly powerful PSUs. Antec rates this as an 80 Plus Platinum PSU, the second most efficient grade possible. Under 100% load it converts a generous 89% of the inputted power into electricity for the PC, helping to cut power bills.

As expected at this price, the HCP Platinum uses a fully modular design. Our power tests showed that this is an extremely reliable source of electricity, with voltages that were well within acceptable realms. It also comes with a seven year warranty, a couple of years longer than the five year standard. Despite this, when compared to other PSUs in the same 1000W+ region, we can't help but conclude that the High Current Pro Platinum 1300W remains vastly overpriced.



\$395 · www.antec.com

OVERALL



Antec TruePower Classic 550W

Aimed squarely at mid-range PCs, this affordable PSU isn't loaded with flashy features like sleeved or modular cables, nor load-adjustable cooling fans. Instead it aims to deliver clean, reliable electricity with a minimum of fuss.

Antec rates this as an 80 Plus Gold product, which equates to 87% efficiency under full load. During our benchmarks, we were pleased to note that the voltage regulation remained within acceptable

boundaries regardless of load. However, voltage ripple wasn't quite as impressive, with the ripple usually hovering around 50mV and increasing up to 86mV. These values are still tolerable, but it's probably not stable enough for a heavily overclocked system.

A five-year warranty is generous at this price point, but the same can't be said of the price. This is very expensive when compared to other PSUs, even those delivering 750W.



\$115 · www.antec.com

OVERALL



BeQuiet Pure Power 500W

As the name suggests, the company behind this power supply has tried to make the quietest unit possible. It does so by using a large 120mm fan to cool the innards of the box, but it's not the only company to do so. During our testing we didn't notice any fan noise, yet the same was true of most units under 750W.

At just \$89, this is a remarkably affordable PSU, so we weren't expecting Earth-shattering results. The Pure Power

500W didn't disappoint, with some relatively low voltages, especially on the +5V signal under full load. This dipped down to a slightly worrying 4.81V, but thankfully the ripple results were more palatable. The 80 Plus Bronze rating is rather ho-hum, delivering just 82% efficiency under load. Despite the lacklustre performance, there's no denying this is a very affordable PSU, making it suitable for budget systems.



\$89 · www.bequiet.com

OVERALL



BeQuiet Straight Power 10 800W

When reviewing 18 different products, there's bound to be at least one that doesn't work as intended, and in the case of this roundup it was the BeQuiet! Straight Power 10 800W. During our initial benchmarking tests, we were pleased to note that this sample maintained its voltages much better than its smaller 500W sibling. And then we got to the 100% load test. Everything looked hunky dory for about 30 seconds, but a small popping sound

and the acrid smell of fried electronics sent our brand new Straight Power 10 800W to an early grave.

If it hadn't failed, we would have been impressed by the relatively low price for such a relatively well-specced PSU, as it comes with an 80 Plus Gold rating, along with a silent oversized 135mm cooling fan. Unfortunately our sample did die though, a fact we can't ignore, which raises some serious alarm bells about the product's reliability.

VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.05V	5.01V	3.33V	5.05V
50% Load	12.08V	5.02V	3.31V	5.02V
100% Load	12.02V	5.03V	3.27V	4.99V



\$169 · www.bequiet.com

OVERALL

N/A



BitFenix Fury 750G

Better known for its popular range of stylish cases, BitFenix is a relative newcomer to the PSU market. That probably explains why the Fury 750G didn't test too well in our benchmarks, with a couple of trouble spots. We're unclear as to whether or not BitFenix actually designed and manufactured this PSU, but either way it falls short.

First and foremost was the +5V signal under full load, which down to 4.82V. Secondly was the voltage ripple under

load on the +12V signal – arguably the most important voltage of all – which peaked at 96mV. Considering the premium price tag, these results are hard to justify, even when considering the beautifully braided cables, semi-modular design and generous five year warranty.

If BitFenix can tune its next range of PSUs to deliver a more stable supply they'll have a winner, but right now the competition simply delivers cleaner power at the same price or less.

VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.19V	4.96V	3.35V	5.03V
50% Load	12.08V	4.92V	3.30V	4.96V
100% Load	12.00V	4.87V	3.24V	4.82V



\$179 · www.bitfenix.com

OVERALL



Cooler Master G750M

Talk about incredible value; it's hard to believe that Cooler Master can put a 750W power supply on shelves for just \$125. Theoretically this is powerful enough to handle a dual GTX 980 system with overclocked CPU, a feat that would have incurred a wallet dent of at least \$200 in the past. Even more impressive is the fact that it uses a semi-modular design, and there are a stack of extension cables in the box, perfect for

even the most component-heavy system. Obviously there's got to be a catch though, right? Apparently not, as our benchmarks attest that this provides a relatively stable and clean source of energy. It's certainly not the best in this regard, but it's also a long way off being the worst, running rings around the likes of the BitFenix Fury 750G. As a result, we highly recommend this for gamers building a powerful system who don't want to spend big.

VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.16V	5.04V	3.40V	5.06V
50% Load	12.08V	4.99V	3.33V	5.10V
100% Load	12.02V	4.94V	3.27V	4.92V



\$125 · www.coolermaster.com.au

OVERALL



Cooler Master V1000

Considering the prior Cooler Master PSU delivered 750W of relatively stable power for just \$125, the doubling in price of this 1000W supply initially caused a few raised eyebrows in the PCTA labs. Closer examination revealed that one of the main differences is the overall efficiency. While the G750M carries the lowly 80 Plus Bronze value, its big brother has the much more economical 80 Plus Gold rating, delivering 87% efficiency under full

load. It's also a fully modular design, and comes with four more PCIe 6+2 pin connectors, for eight in total, making it a perfect match for quad GPU PCs.

Most impressive of all was its performance on the load tester, with the V1000 delivering some of the cleanest results in the roundup. Add a five year warranty and that price leap now makes total sense – this is a power supply of the highest quality, at an extremely reasonable price.



\$249 · www.coolermaster.com.au

OVERALL



Corsair HX1000i

Considering the excellent results of the Cooler Master V1000, the Corsair HX1000i faces some stiff competition, especially as it costs just \$30 more.

Looking at the features we see this is a fully modular design, and it comes with just as many cables as the Cooler Master, making it a good fit for quad GPU systems packing lots of hard drives.

The 80 Plus Platinum rating goes one better than the V1000, as this is basically

as good as PSUs get in consumer-land. Best of all though has to be Corsair's brilliant Link control, which allows the user to monitor the PSU's voltages via the Windows desktop. This feature alone makes the HX1000i a highly desirable power supply for enthusiasts.

Throw in staggeringly tight voltage regulation and ripple results, and the HX1000i ends up being a killer of a PSU on par with the Cooler Master V100 and one of the best you can buy today.



\$279 · www.corsair.com

OVERALL



Corsair HX750i

Given the brilliant impression Corsair's HX1000i left on us, we expected great things from the HX750i. Unfortunately our first review sample exhibited a problem we've stumbled upon occasionally in past PSU reviews – coil whine.

The PSU remained silent until we hit 100% load, upon which it emitted an annoying high-pitched screech. Thankfully we had a second HX750i in the lab, and

this one worked perfectly; Corsair assured us the coil whine isn't a common problem, and scouring support forums proved as much. That said, such variability between two samples is still a concern.

The second unit returned some solid voltage regulation results, albeit consistently lower than expected.

At \$215 the HX750i needed to blow our socks off, but it ended up failing to impress.



\$215 · www.corsair.com

OVERALL



Fractal Design Integra M 750W

We're not intimately familiar with Fractal Design's PSUs, so we're keen to see what this 750 Watt product could do. With the most affordable price tag at this power range, we weren't expecting much. To our surprise, this budget beast uses a semi-modular cable design, but the range of additional cables is rather limited. The 80 Plus Bronze rating is to be expected at this level of affordability, though we do have to question whether it's worth

spending less on a PSU that will chew through more power; buying a more efficient model for \$50 extra will probably pay for itself in less than a year.

One interesting facet of this PSU is the 140mm length of the case, making it easier to fit inside smaller cases. Performance was solid if unremarkable, basically tying with the CoolerMaster G750M. Considering it's even cheaper than this, we have no hesitation in recommending the Integra M 750W.

VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.15V	5.14V	3.40V	5.13V
50% Load	12.08V	5.11V	3.37V	5.10V
100% Load	12.07V	5.06V	3.33V	5.08V



\$119 · www.fractal-design.com

OVERALL



Fractal Design Edison M 750W

At exactly the same wattage as the Integra M, Fractal Design's new Edison M PSU has been built with the aid of Seasonic, one of the biggest OEM makers of power supplies.

The Edison M carries the more efficient Gold rating. Once again Fractal Design has used a semi-modular cable approach; we expected to see a fully modular design for this price. The company claims that the Edison M also uses higher quality Japanese capacitors, which should result in a more

stable supply of electricity. The cooling system in both is identical, relying on a temperature-controlled 120mm fan which is whisper-quiet at idle.

Our performance tests indicate that the Edison M does slightly better when it comes to voltage regulation, but we were very surprised by the ripple results. At all loads, the Edison M had much higher ripple than its cheaper brethren, a disappointing result. As a result, we have to give the Integra M the nod over its newer relative.

VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.22V	5.01V	3.35V	5.06V
50% Load	12.10V	4.98V	3.32V	5.02V
100% Load	12.04V	4.95V	3.29V	4.98V



\$159 · www.fractal-design.com

OVERALL



SilverStone Strider Essential Series 600W

SilverStone power supplies are known for being of the absolute highest quality, with wallet-bashing prices to match. So when we saw that the company had a 600W unit for just \$79, we had to check it out. The first thing we noticed was the lowly 80 Plus rating, which makes this one of the least efficient power supplies in the roundup. All cables are firmly attached to this power supply, so there's no way to hide the extra cables that aren't used.

Not that it has too many, with just a single 8-pin PCIe connector.

This fact alone will make it unsuitable for those running GPUs that require twin 8-pin power plugs to quench their power thirst. Thankfully the voltage regulation and ripple results were very good.

While it mightn't be the most efficient power supply around, for \$80 it does a fine job of supplying clean, stable electricity to your system.

VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.23C	5.00V	3.33V	5.02V
50% Load	12.15V	4.96V	3.28V	4.92V
100% Load	12.10V	4.83V	3.23V	4.91V



\$79 · www.silverstonetek.com

OVERALL



SilverStone Strider Gold Evo 1200W

At \$250, the Strider Gold Evo 1200W is priced where we've seen SilverStone PSUs in the past, targeting enthusiasts who have a little extra to spend. The fully modular design includes a stack of extra cables, yet it's limited to powering four 8-pin PCIe plugs, which could hold back those looking to build triple and quad GPU systems. Sadly there's also none of the digital monitoring offered by Corsair's awesome Link feature, but this complaint isn't limited

to SilverStone, as nobody else offers it either. The ultra-quiet 139mm cooling fan keeps this PSU whisper quiet, even under sustained load, while the 80 Plus Gold efficiency rating is a welcome inclusion. Our test results showed that this product delivers a very stable supply, even at the high end of 1200W, a feat that should be commended. It might not have the flashiest features, but if you're looking for an affordable 1200W of clean juice, you could do a lot worse.



VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.05V	5.02V	3.34V	5.02V
50% Load	12.05V	4.99V	3.33V	4.98V
100% Load	11.99V	4.97V	3.26V	4.97V

\$249 · www.silverstonetek.com

OVERALL



SilverStone Strider Plus 750W

PPSUs pumping out 750W are incredibly commonplace, making this one of the fiercest arenas for competing products. SilverStone's entrant into this market is priced very competitively, towards the more affordable range of products. Yet the company hasn't scrimped on this power supply, starting off with the fully modular cable design, although there are only twin 8-pin PCIe plugs. A large 135mm fan keeps the interior cool while remaining

basically inaudible. It's rated as an 80 Plus Silver product, which converts 85% of the incoming power to electricity used within the PC. The 160mm depth mightn't be quite as small as the Integra M 750W's 140mm, but it's still considerably smaller than other PSUs. Our voltage regulation and ripple results turned in some decent numbers, although ripple on the +12V signal at 100% load did climb to a slightly high 78mV. Overall this is a solid, if unremarkable, 750W power supply.



VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.23V	5.00V	3.33V	5.02V
50% Load	12.15V	4.96V	3.28V	4.92V
100% Load	12.10V	4.83V	3.23V	4.91V

\$139 · www.silverstonetek.com

OVERALL



Thermaltake Toughpower DPS G 1050W

Thermaltake is the only supplier outside of Corsair to fit its high-end PSU with digital monitoring capabilities. The company calls this DPSapp software, which shows basic voltage, wattage and efficiency ratings. Best of all it can calculate how much your PC is costing you, as the user can enter the cost of their electricity. The 80 Plus Gold rating is excellent, as is the lengthy seven year warranty. Obviously cabling is of the

modular design, and Thermaltake delivers six 8-pin PCIe connectors for running three high-end GPUs.

Our benchmarks showed that the DPS G consistently under-delivers, especially as the load rose to 100%, but it was still within safe parameters. Having said that, it might not be the best PSU for those looking to do extreme overclocking and thus need the absolute cleanest supply of electricity.



VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.09V	4.98V	3.27V	5.01V
50% Load	11.92V	4.99V	3.26V	5.00V
100% Load	11.86V	4.95V	3.22V	4.91V

\$279 · www.thermaltake.com.au

OVERALL



Thermaltake Toughpower Gold 750W

Here comes another one, just like the other one... yep, it's yet another 750W power supply, which is apparently the sweet spot in the market based on the volume sent to us for testing. As the name indicates, this little box of juice carries the 80 Plus Gold moniker, making it extremely power efficient for the price. The semi-modular cable design will cut down on clutter, and the inclusion of four 8-pin plugs is definitely appreciated at this price. A 135mm fan handles the task of

keeping the PSU cool, which automatically adjusts its speed based on the overall power load of the system. Our voltage regulation results showed that this PSU sticks to the defined voltages required, but we did notice slightly higher ripple on the +12V signal at 100% load, a common issue amongst many of the PSUs we tested. Overall this is a decent box that doesn't do a whole lot to stand out from the pack, apart from having a slightly higher price tag, and slightly better 80 Plus rating.



VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.15V	5.07V	3.33V	5.10V
50% Load	12.08V	5.04V	3.31V	5.06V
100% Load	12.04V	5.00V	3.27V	5.00V

\$159 · www.thermaltake.com.au

OVERALL



XFX PRO 1000W

Retailers who stock XFX power supplies are few and far between, which isn't too surprising when comparing it against similarly priced power supplies.

To be frank, this 1000W is very expensive, placing it against the likes of the Corsair HX1000i and Cooler Master V1000, both of which are considerably more affordable.

For the higher price you get the 80 Plus Platinum rating, but this is also found on

the HX1000i. The five year warranty is also par for the course, and the PRO 1000W lacks any form of digital monitoring.

What it does deliver is absolutely impeccable performance, with its voltage regulation and ripple results being some of the very best in the roundup.

For those who demand the ultimate in power stability, this fact alone might make the higher price tag slightly easier to justify, and while not exactly a style leader it is one of the better-looking PSUs we saw.



\$309 · www.xfxforce.com

OVERALL



XFX TS Gold 650

At \$100, this power supply is exceptionally well priced considering it pumps out 650W of energy, more than enough for most performance PCs. This is even more impressive considering the 80 Plus Gold rating that this unit carries, which is rather rare at such an affordable sticker price. Don't expect any fancy features though, as the TS Gold 650 focuses instead on clean, reliable energy rather than bullet-

points on the back of the box. All cables are permanently affixed to the case, and not one of them includes the 8-pin PCIe plug required by high-end gamer cards; apparently XFX thinks everybody at this price point will be happy with the four 6-pin PCIe plugs.

If the lack of 8-ping plugs isn't an issue, the above-average voltage regulation and ripple results should be reassuring. Overall a solid power supply for the price.



\$99 · www.xfxforce.com

OVERALL



VOLTAGE RESULTS	+12V	+5VSB	+3.3V	+5V
10% Load	12.23V	5.00V	3.36V	5.05V
50% Load	12.15V	4.97V	3.34V	5.02V
100% Load	12.11V	4.93V	3.30V	4.97V

Ripple Results

RIPPLE EXPLAINED

Electricity is like every other form of energy, taking the form of a wave. Each wave has peaks, the top of the wave, and troughs, the bottom of the wave. When we measure the voltage ripple, we're really just measuring the maximum difference between the peak and trough of the waves.

Our PCs desire the smallest ripple value possible; if it is too high, the power regulating features on the motherboard, CPU, graphics card and other components have to work extra hard to smooth out the difference. This can cause instability and extra wear over time.

That's why we gave extra points to the PSUs that had the lowest ripple values.

Anything below 20mV is excellent, as this is an exceptionally low ripple.

Between 20mV and 40mV is still good, while between 40mV and 70mV is just plain average.

Once ripple measurements start being recorded over 70mV, it's time to question the purchase of a given PSU. And anything over 100mV is downright terrible.

Thankfully we didn't have any PSUs that fell into this last category this roundup, as opposed to twelve months ago when several PSUs recorded ripple values of over 100mV.

It seems most PSU manufacturers have improved their products over the last year, which our testing reinforces, which is a very pleasing result.



A medium ripple result of 35.6mV

ANTEC HIGH CURRENT PRO PLATINUM 1300W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	45mV	37mV	56mV	34mV
50% Load	23mV	32mV	25mV	24mV
100% Load	43mV	45mV	38mV	35mV

ANTEC TRUEPOWER CLASSIC 550W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	58mV	36mV	48mV	56mV
50% Load	80mV	50mV	54mV	58mV
100% Load	86mV	66mV	76mV	78mV

BEQUIET PURE POWER 500W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	30mV	30mV	40mV	30mV
50% Load	46mV	56mV	64mV	40mV
100% Load	50mV	46mV	66mV	38mV

BEQUIET STRAIGHT POWER 10 800W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	36mV	66mV	30mV	34mV
50% Load	46mV	66mV	42mV	34mV
100% Load	BLEW UP	BLEW UP	BLEW UP	BLEW UP

BITFENIX FURY 750G

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	36mV	18mV	20mV	20mV
50% Load	44mV	20mV	24mV	14mV
100% Load	96mV	20mV	30mV	26mV

COOLERMASTER G750M

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	38mV	34mV	52mV	34mV
50% Load	44mV	34mV	40mV	34mV
100% Load	54mV	36mV	46mV	46mV

COOLERMASTER V1000

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	22mV	18mV	14mV	12mV
50% Load	14mV	23mV	16mV	13mV
100% Load	33mV	31mV	27mV	31mV

CORSAIR HX1000I

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	20mV	20mV	14mV	16mV
50% Load	24mV	22mV	28mV	14mV
100% Load	28mV	20mV	20mV	16mV



CORSAIR HX750I

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	24MV	14MV	16MV	14MV
50% Load	24MV	22MV	28MV	18MV
100% Load	32MV	24MV	22MV	22MV

FRACTAL DESIGN EDISON M 750W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	38MV	36MV	32MV	34MV
50% Load	44MV	42MV	36MV	38MV
100% Load	68MV	50MV	52MV	48MV

SILVERSTONE STRIDER GOLD EVO 1200W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	36MV	12MV	12MV	14MV
50% Load	62MV	18MV	14MV	16MV
100% Load	112MV	24MV	18MV	22MV

THERMALTAKE TOUGHPOWER DPS G 1050W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	18MV	20MV	12MV	16MV
50% Load	24MV	34MV	16MV	16MV
100% Load	56MV	60MV	18MV	20MV

XFX PRO 1000W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	20MV	16MV	16MV	18MV
50% Load	24MV	18MV	14MV	18MV
100% Load	38MV	22MV	20MV	24MV

Conclusion

After three solid days of benchmarking, we feel confident that we've seen the best the PSU market has to offer. While there are a lot of me-too products nearly all of these power supplies deliver power that is stable enough for the average, everyday system. In the past we've seen PSUs with ripple values over 100mV, but this time around the vast majority were well below.

If the budget is exceptionally tight, and your needs aren't too demanding, we think the XFX S Gold 650 is a bargain at

\$99. It might not be feature-laden, and the lack of an 8-pin PCIe plug will deter hardcore gamers, but its above average voltage regulation and ripple results are impressive at this price point.

For those on a mainstream budget, the Cooler Master G750M offers outstanding value for money. Delivering 750W of very clean power, it's powerful enough for even performance PCs packing twin GPUs. At just \$125 it's one of the most affordable 750W power supplies, yet its

semi-modular design makes it worthy of a much higher price point.

At the expensive end of town we have to give the thumbs up to Corsair's mighty HX1000i. Not only does it pump out extremely reliable power, even when under full load, it also comes with the excellent Corsair Link digital monitoring feature.

While Thermaltake also offers this, the excellent price of Corsair's HX1000i makes it the one to beat.

FRACTAL DESIGN INTEGRA M 750W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	20MV	18MV	18MV	20MV
50% Load	28MV	18MV	20MV	24MV
100% Load	44MV	18MV	26MV	28MV

SILVERSTONE STRIDER ESSENTIAL SERIES 600W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	36MV	56MV	28MV	16MV
50% Load	34MV	44MV	30MV	44MV
100% Load	54MV	60MV	18MV	40MV

SILVERSTONE STRIDER PLUS 750W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	44MV	38MV	38MV	36MV
50% Load	68MV	58MV	66MV	52MV
100% Load	78MV	60MV	66MV	66MV

THERMALTAKE TOUGHPOWER GOLD 750W

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	26MV	20MV	18MV	20MV
50% Load	36MV	44MV	24MV	22MV
100% Load	76MV	56MV	26MV	28MV

XFX TS GOLD 650

RIPPLE (P-P)	+12V	+5VSB	+3.3V	+5V
10% Load	18MV	18MV	16MV	16MV
50% Load	24MV	20MV	18MV	12MV
100% Load	44MV	22MV	20MV	26MV



msi[®]

MSI recommends Windows 8.



MERRY MSI CHRISTMAS

Promotion available at selected stores from December 1st - December 30th or while stocks last.

Valid on models GT72, GT70, GT60, GS70, GS60, GE70 and GE60.

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VIC	Budget PC Centrecom CPL Landmark Computers PC Case Gear Prototech Computers Scorptec Standard Computers Tecs Umart	https://budgetpc.com.au/ http://www.centrecom.com.au/ http://www.cplonline.com.au/ http://www.lmc.com.au/ http://www.pcCASEgear.com/ http://www.prototech.com.au/ http://www.scorptec.com.au/ http://www.standard.com.au/ http://www.tecs.com.au/ http://www.umart.com.au/	(03) 9541 9000 (03) 8311 7651 (03) 8542 8688 (03) 9600 2244 (03) 9560 2122 (03) 5444 1980 (03) 8561 3206 (03) 9315 1234 (03) 9602 3499 (03) 9590 8688	WA	Affordable Laptops PLE Austin Computers	http://www.affordablelaptops.com.au/ http://www.ple-com.au/ http://www.austin.net.au/	(08) 6461 6836 (08) 9309 4771 1300 787 429
				SA	Getright Computers	http://www.getright.com.au	(08) 8231 0622
				NZL	Computer Lounge Just Laptops Playtech	http://www.computeralliance.com.au/ http://www.playtech.co.nz/ http://www.justlaptops.net.nz/	(09) 368 4818 0800 587 852 (09) 415 1020

Smartwatches

THE FUTURE IS ON YOUR WRIST, BUT WHICH SMARTWATCH SHOULD YOU BUY?

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Buyer's guide

IT'S ALL TOO EASY TO FALL FOR GOOD LOOKS AND GIMMICKY FEATURES. READ THIS GUIDE TO ENSURE YOU SPEND YOUR MONEY ON A SMARTWATCH THAT DELIVERS ON ITS PROMISES

Smartwatches aren't exactly new. Arguably, they've been around since the 1980s, when Casio pioneered the calculator watch, with fitness functions following in the 1990s and 2000s.

But a modern smartwatch is differentiated from these devices of yore by two key capabilities: communication and extensibility. The watches on test this month can be thought of as smartphones on your wrist – devices that are endlessly expandable through apps, and keep you in closer contact with the wider world than ever before.

Basic smartwatch functions are largely the same across all models. The watch can act as a regular timepiece, with a customisable digital face, but its main role is to partner with your smartphone: it can deliver notifications from your phone to your wrist, allow you to read short emails

and messages, and control music and media playback.

Many smartwatches can also function as activity trackers, using an accelerometer to measure how many steps you've taken in a day or a week. Some offer additional functions such as the ability to measure your heart rate, answer calls on the watch, dictate messages, and set reminders or timers by voice control.

SOFTWARE AND COMPATIBILITY

It's important to consider not only the capabilities of the device itself, but also the underlying software platform, since this dictates which type of smartphone you need to make it work. Watches running Google's Android Wear will work only with smartphones running Android 4.3 or later, while several Samsung watches (including the Gear 2, Gear 2 Neo and Gear Fit) use

"Android Wear is the cleverest platform we've seen, combining a touch-based UI with the intelligence of Google Now"

a proprietary OS that will only work with certain Samsung phones. Once you've ruled out incompatible smartwatches, your choice may not be as broad as it first appeared. If you're using an iPhone and don't want to wait until next year for the Apple Watch, your only option is the Pebble, which works with both iOS and Android – making it this month's only cross-platform watch. In other words, make sure the smartwatch you've fallen in love



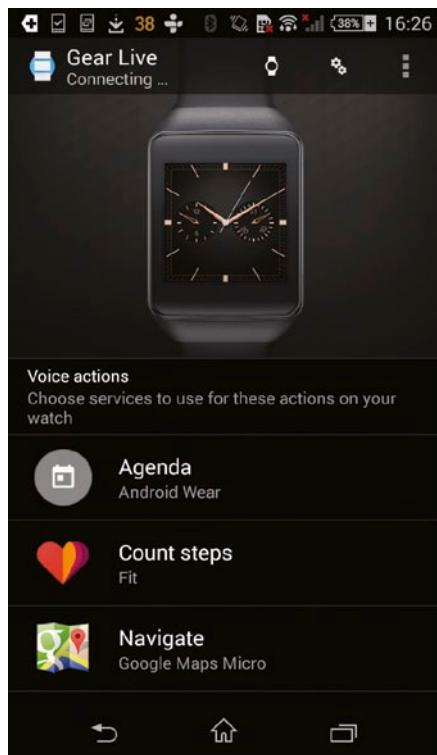
1 Most smartwatches are square-faced, but Android Wear gives manufacturers the option to build circular devices. The Motorola Moto 360 is the first of these, but others – such as the LG G Watch R – are waiting in the wings

2 Most functions are accessed via a touchscreen, but a button can be useful for quickly switching on the display



3 Watch out for devices that come with proprietary strap fittings: if yours breaks, you'll have to replace it with one from the manufacturer's limited selection. However, several models have 22mm fittings, which means you can fit any strap you wish

4 Many smartwatches have an optical heart-rate monitor; these use infrared light to monitor your pulse



▲ The Samsung Gear Live allows you to navigate various features, including maps, using your voice



5 Charging your smartwatch is something you'll need to do on a frequent basis, so a simple method is an excellent idea. So far, most manufacturers have opted for proprietary, clip-on bases, which draw power via a USB cable. A more convenient method is Qi wireless charging, as used by the Moto 360

HOW WE TEST

Modern smartwatches are a new type of device, and benchmarking tools are yet to emerge for the most popular platforms. Our score for performance is based on subjective experience: top marks go to the devices that felt consistently responsive and stutter-free in testing. To measure battery life, we enabled vibration and set the screen to full brightness, with the timeout set as short as possible. We then linked the watch to a Google account and triggered appointment notifications every five minutes for four hours, recording the battery capacity before and after. We then expressed the result as a projected full runtime.

We measured the maximum screen brightness with our X-Rite i1Display Pro colorimeter. Not every watch face was large and flat enough for the lens, and it wasn't always possible to obtain a blank white screen for accurate measurement, so we haven't been able to give a figure for every device. However, this method provided a useful ballpark figure.

with works with the phone you own. It's a good idea to plan ahead and think about whether it will work with your next phone as well.

Also, be aware that smartwatches don't all work in the same way. Of the platforms on offer, Android Wear is the cleverest we've seen, combining a touch-based UI with the intelligence of Android's Google Now system. This delivers notifications in the familiar "card" format and attempts to preempt your activity for the day, supplying useful information such as upcoming sports fixtures and travel details. It will even warn you about traffic on your commute.

Other smartwatch systems are less proactive in the way they work, but all of them allow you to install apps to extend their capabilities.

DESIGN AND APPEARANCE

A smartwatch is intended to be worn all day, so another important factor is how the watch looks and feels on your wrist. With the market in its infancy, there isn't endless aesthetic choice: the most exciting development so far is the round-faced Motorola Moto 360, but the rest of the market is dominated by chunky, square-faced devices. Even the Apple Watch is a rectangular affair, although two sizes will be on offer at launch.

When it comes to the strap, you normally have options, but some smartwatches use a proprietary attachment that limits you to official accessories. The Pebble Steel, for example, uses a custom fitting, although there is a choice of metal and leather bands. Other designs are more open: the Samsung Gear 2 and Gear Neo, plus the LG G Watch, employ a standard 22mm spring bar attachment, so you can use any strap.

THE SCREEN

Every time you check your watch face, notifications and apps, you'll be staring at the screen – so you want it to look good.

The main question is whether you want a monochrome or a colour display. Colour displays are more common, and have more visual appeal, but there are downsides: they are more power-hungry than monochrome displays such as the Pebble's LCD e-paper display,

so battery life is likely to be worse.

A colour screen will normally be more difficult to read in direct sunlight, too; even at maximum brightness, you may need to shield the screen. Monochrome screens, on the other hand, use reflective technology, so they're readable in even the harshest glare. In dark conditions, there's usually some kind of backlight that needs to be activated, but this isn't much of a problem.

BATTERY LIFE AND CHARGING

No matter what screen you have on your smartwatch, you shouldn't expect amazing battery life. The best performer we've seen is the Pebble Steel, which delivers in the region of five days of normal use per charge; most watches with colour screens will last only one or two days before needing a top-up. That's quite a step down from the years of use you used to get from a 1980s digital watch.

With this in mind, consider how convenient it is to charge the device. Most watches available at the moment employ proprietary clips or magnetic contacts to secure a USB charging cable to the watch, which means you'll have to remember to take the relevant attachment with you wherever you go.

The exception is the Moto 360, which charges wirelessly via the Qi standard, so you can use a certified charger from any compliant vendor.

The Apple Watch, when it arrives, will also use wireless charging but, based on past experience with Apple, we expect this to more than likely end up being a proprietary system.



	LG G Watch	Motorola Moto 360	Pebble Steel	LABS WINNER
OVERALL	★★★★☆	★★★★☆	★★★★☆	
PRICING/SUPPORT				
Price	\$259	\$329	\$229	
Manufacturer	lg.com/au	motorola.com.au	getpebble.com	
Dimensions (WDH)	38 x 10 x 47mm	47 x 11.9 x 46mm	34 x 10.5 x 46mm	
Weight	54g	49g	59g	
Warranty	1yr	1yr	1yr	
DISPLAY				
Size	1.65in	1.56in	1.26in	
Shape	Square	Circular	Rectangular	
Resolution	280 x 280	320 x 290	144 x 168	
Panel type	IPS	IPS	e-paper (monochrome LCD)	
Glass type	Gorilla Glass 3	Gorilla Glass 3	Optical hard coating	
KEY FEATURES				
Operating system	Android Wear	Android Wear	Pebble OS	
CPU	1.2GHz Qualcomm Snapdragon 400	1GHz TI OMAP 3	800MHz ARM Cortex-M3	
RAM	512MB	512MB	512MB	
Storage	4GB	4GB	8MB	
Camera (resolution)	✗	✗	✗	
Battery capacity	400mAh	320mAh	130mAh	
Water-resistance	IP67	IP67	IP67 (50m)	
Compatibility	Android 4.3+	Android 4.3+	Android 4.1+, iOS 6+	
SENSORS				
Heart-rate sensor	✗	✓	✗	
GPS	✗	✗	✗	
Accelerometer	✓	✓	✓	
Compass	✓	✗	✓	
Ambient light sensor	✗	✓	✓	
CONNECTIVITY				
Bluetooth	LE	LE	LE	
Charging port	Magnetic micro-USB base	Qi wireless charging	Magnetic-latch USB cable	
FUNCTIONS & NOTIFICATIONS				
Alternative watch faces	✓	✓	✓	
Turn-by-turn navigation	✓	✓	✓ (via third-party app)	
Voice calls	✗	✗	✗	
Call screening	✓	✓	✓	
Message notifications	✓	✓	✓	
Message dictation	✓	✓	✗	
Voice controls	✓	✓	✓	
Music controls	✓	✓	✓	
Infrared remote	✗	✗	✗	
STRAPS & ACCESSORIES				
Strap attachment	22mm	22mm	Proprietary	
Other accessories	✗	Wireless charging cradle	Leather and steel straps	



Samsung Gear 2	Samsung Gear 2 Neo	Samsung Gear Fit	Samsung Gear Live
★★★★☆	★★★★☆	★★★★☆	★★★★☆
\$299	\$249	\$149	\$250
samsung.com/au	samsung.com/au	samsung.com/au	samsung.com/au
37 x 58.4 x 10mm	38 x 58.8 x 10mm	23 x 57.4 x 12mm	38 x 11.5 x 56mm
68g	55g	27g	60g
1yr	1yr	1yr	2yr
1.63in	1.63in	1.84in	1.63in
Square	Square	Curved rectangle	Square
320 x 320	320 x 320	432 x 128	320 x 320
Super AMOLED	Super AMOLED	Super AMOLED	Super AMOLED
Gorilla Glass 3	Gorilla Glass 3	Gorilla Glass 3	Not stated
Tizen	Tizen	Samsung proprietary	Android Wear
1GHz Samsung Exynos 3250	1GHz Samsung Exynos 3250	1.8GHz STM32F439	1.2GHz Qualcomm Snapdragon 400
512MB	512MB	512MB	512MB
4GB	4GB	4GB	4GB
✓ (2MP)	✗	✗	✗
300mAh	300mAh	210mAh	300mAh
IP67	IP67	IP67	IP67
Samsung Galaxy smartphones	Samsung Galaxy smartphones	Samsung Galaxy smartphones	Android 4.3+
✓	✓	✓	✓
✗	✗	✗	✗
✓	✓	✓	✓
✗	✗	✗	✗
✗	✗	✗	✗
LE	LE	LE	LE
Clip-on micro-USB dock	Clip-on micro-USB dock	Clip-on micro-USB dock	Clip-on micro-USB dock
✓	✓	✓	✓
✗	✗	✗	✓
✓	✓	✗	✗
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✗	✓
✓ (plus local playback)	✓ (plus local playback)	✓	✓
✓	✓	✗	✗
22mm	22mm	Non-removable	22mm
✗	✗	✗	✗

Pebble Steel

AN INVITING REFINEMENT OF THE ORIGINAL PEBBLE THAT WORKS WITH A WIDE RANGE OF PHONES AND ENJOYS DECENT BATTERY LIFE

The Pebble and its more luxurious sibling, the Pebble Steel, have been around for a while now, with the device available via the online via getpebble.com, and shipping worldwide.

It's not that the Pebble is the most attractive smartwatch out there. The Steel, tested here, is all corners and angles, with three chunky, square buttons on the right edge and one at the other side. In fact, with a strip of inlaid black plastic surrounding the watch just beneath the screen bezel, and a thick black border surrounding a monochrome screen, it's bordering on ugly. It certainly doesn't match the elegance of the Motorola Moto 360.

Yet, with the black, leather strap attached – the watch comes with a more ostentatious steel-link wristband as well – the Steel exudes a certain retro charm. The fact it's fairly compact helps: aside from the Samsung Gear Fit, the Steel is the smallest, least obtrusive smartwatch we've seen, measuring only 10.5mm thick, 34mm across and 46mm tall.

It's also worth pointing out that it's extremely tough – much more so than most modern smartwatches. The promised five atmospheres of water-resistance means it will withstand being submerged 50m under water before breaking or leaking. This should be sufficient for the odd swim down the local pool.

SPECIFICATIONS AND FEATURES

The Steel isn't exactly a showcase of cutting-edge technology. That black-and-white screen is small, too, with a low resolution of 144 x 168. Stretched across a 1.26in square display, this delivers a pixel density of 176ppi, which means

✓ The Pebble Steel is charged via a magnetic-latch cable



plenty of jagged edges, particularly along the diagonal edges of the watch hands.

Inside, meanwhile, is a low-powered, single-core ARM Cortex-M3 processor running at 800MHz, coupled with 512MB of RAM and a mere 8MB of storage for apps and watch faces. It's a positively prehistoric specification compared to the latest models from Motorola, Samsung and LG, which use processors similar to those in their smartphone companions and also offer gigabytes of storage.

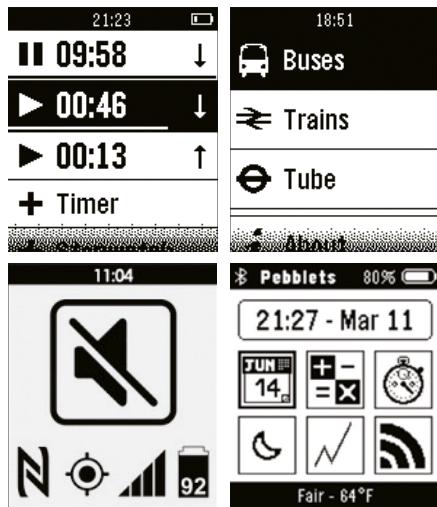
Don't expect any fancy features with the Steel, either: there is no touchscreen, with Pebble opting for button-based controls; there is no heart-rate monitor;

there is no camera; and there is no voice recognition. The Steel is truly a barebones smartwatch.

SOFTWARE AND APPS

Although the Steel may seem unambitious, when it comes to the basics, it delivers. As with Android Wear and Samsung Gear devices, setup is a simple case of installing a companion app on your smartphone and pairing the devices over Bluetooth. Once this is done, notifications are diverted to appear instantaneously on your wrist.

Emails, texts, calendar events, social-network status updates and even phone



Since the Pebble has been around longer than most smartwatches, it boasts an unrivalled range of apps

calls arrive without fuss. And, although you can't actually carry out a conversation on the smartwatch, you can screen and reject calls, which is handy if you're in a meeting and want to keep tabs discreetly on incoming communications.

Because Pebble has been going for longer than its rivals, there's a huge selection of watch faces to choose from – and thousands of different apps to install as well. These are divided into six categories: Daily, Notifications, Tools and Utilities, Health and Fitness, Remotes, and Games. Some favourites of ours include Toggles, which lets you switch on and off phone features such as Bluetooth and Wi-Fi from your wrist; Nav Me, which delivers turn-by-turn navigation courtesy of Google Maps. Have a trawl through the list on the Pebble website and you'll really get a flavour of what a smartwatch can do for you.

The only real disappointment is that, despite this embarrassment of riches, there's only space on the Steel to store eight apps or watch faces. Any apps that aren't in use can be kept in the smartphone app's "locker", but you have to swap them in and out once you hit the storage limit.

The USB charging cable snaps magnetically onto the smartwatch



PEBBLE STEEL VS PEBBLE: WHAT'S THE DIFFERENCE?

If you like the idea of the Pebble Steel but baulk at the price, the original Pebble is worth considering.

The main difference is the design. Whereas the Steel is sleek and slim, the standard Pebble is chunky and made from plastic. The older Pebble has a standard 22mm strap fitting, so you can use a strap of your choosing. It also has less storage (4MB as

opposed to 8MB), but since it stores the same number of apps (eight), this doesn't matter too much. The only other difference is that the Steel has an LED to indicate when it's fully charged.

Considering it has the same software, battery, screen and water-resistance as the Steel, the original Pebble is a bit of a bargain at around \$150.

PERFORMANCE AND BATTERY LIFE

Although the Steel makes several compromises, it also has several strengths. One is that its performance is brilliant. There's no lag, nor any danger of missing an incoming text or calendar event: all notifications come through instantaneously and with a firm buzz.

Moreover, it's also the only smartwatch we've tried that lasts for reliably longer than two days of use; it's much less likely than its rivals to give out on you at the end of a busy day. Pebble claims the watch will run for four to six days between charges, and we wouldn't argue: we regularly managed to eke out five days of use before having to snap on the USB magnetic charging tether to give it a top-up. That's thanks to a combination of the low-power processor, a lightweight operating system – called Pebble OS – and a highly efficient LCD screen.

And it's the screen that's the star of the whole shebang. Although it's monochrome, it's exceedingly easy to read. Like an old-fashioned Casio digital watch, the Pebble uses a reflective screen that gets easier to read in bright sunlight: you've no need to squint at the display or shield it with your hand. Admittedly, this means it's harder to make out in the dark, but that's easily remedied: a flick of the wrist momentarily bathes the watch face in a faint indigo glow, so you can check the time or read your emails when you wake up in the middle of the night.

VERDICT

The Pebble Steel isn't as sparkly or shiny as the latest Android Wear devices, and it lacks hi-tech features such as voice and touchscreen controls. However, as a



wrist-borne notification centre, it works just as well as any of the better-specified devices – and it boasts greatly superior battery life. It's easier to read when you're out and about, and it will take more abuse, too.

At \$229 (and you won't have much trouble ordering one online from a grey importer even cheaper), the Pebble Steel isn't the cheapest smartwatch out there, but it's eminently reasonable when you consider what you get for the money. Indeed, the Steel is the first smartwatch we've come across on which we'd seriously consider spending our own money, and that not only speaks volumes for the Pebble, but for all the others, too.

BATTERY LIFE



OVERALL



LG G Watch

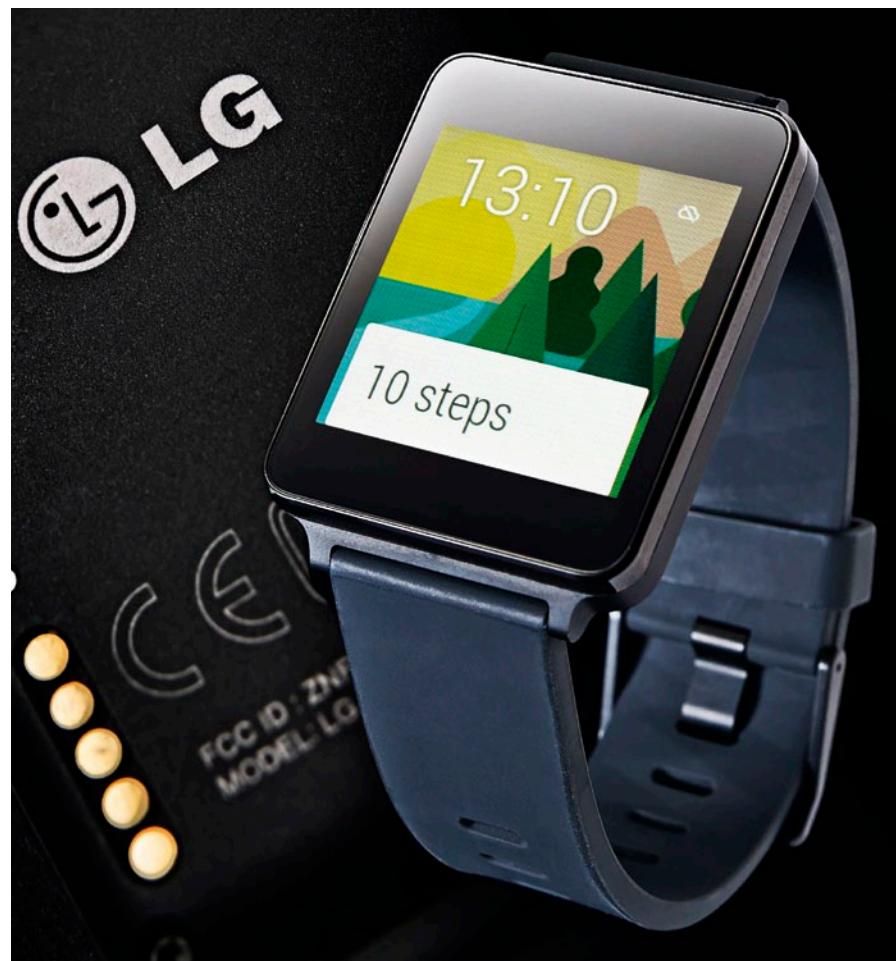
THE FIRST ANDROID WEAR SMARTWATCH IS BASIC, BUT IT'S REASONABLY PRICED AND OFFERS A LARGE BATTERY

Back in July, the LG G Watch was one of the devices that launched Android Wear – and, at the time, our enthusiasm for the new platform was dampened by this watch's rather bland, generic design.

After a few weeks of living with the G Watch, our opinion has softened a little. Its appearance may still be uninspiring, but we've found the rubber plastic strap more comfortable on the wrist than most, and we've quickly become accustomed to having Android Wear's Google Now-style notifications and voice-recognition system instantly available. There's no heart-rate monitor, but since most of the watches we've seen with the sensor aren't particularly accurate, this isn't a great loss.

Similarly, while we weren't initially impressed with the G Watch's battery life, we're a little more appreciative now that we have other Android Wear smartwatches to compare it to. The G Watch's 400mAh battery is the largest of any smartwatch we've tested this month and, in conjunction with an efficient Qualcomm Snapdragon 400 processor, it delivers decent battery life for a watch with a colour screen. In our notifications test, it achieved a projected runtime of 50 hours, almost matching the Samsung Gear 2 and Samsung Gear 2 Neo for

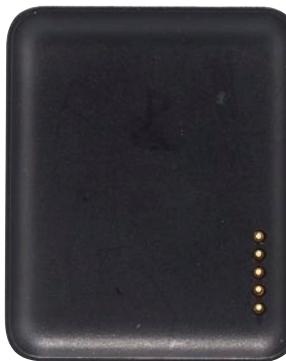
While the design is uninspiring, the LG is comfortable to wear and compatible with myriad smartphones



stamina. In real-world use, this boils down to around a day with the screen on permanently and up to two days with the screen set to time out.

The G Watch still has some fairly major problems, however. First, its IPS screen is disappointingly dim: in direct sunlight, we struggled to see anything on its 280 x 280-resolution display without shading it with our free hand. There's no ambient light sensor, either, so if you set the screen to maximum brightness for use during the day, the first time you look at it in the evening can be a bit of a shock.

The wrist-twisting gesture that's supposed to switch on the display, meanwhile, barely works at all. In the end, we gave up on it altogether and resorted to tapping to wake up the watch. This is a pain, but it has some benefits: since the screen hardly ever turns on accidentally, you save battery life. Also, if you're the type who wears a watch in bed, you're less likely to turn it on by rolling over.



◀ The magnetic charging cradle snaps satisfyingly into the G Watch

We don't like the fact that there's no physical button, as there is on the Motorola Moto 360, nor are we fans of the proprietary magnetic docking cradle. As far as we're concerned, Qi wireless charging is the way to go with these devices, today at least. There are reasons to like

the LG G Watch, though: it's the cheapest watch in this group; it's comfortable to wear; it works with all smartphones running Android 4.3 and above; and it has comparatively good battery life. However, there are just a few too many negatives for it to gain our seal of approval.

BATTERY LIFE



OVERALL



Motorola Moto 360

A BEAUTIFUL, CIRCULAR SMARTWATCH THAT'S PACKED WITH CLEVER FEATURES, BUT LET DOWN BY POOR BATTERY LIFE

The launch of the Moto 360 was surrounded by so much hype it seemed impossible that this Android Wear device could live up to expectations. And so it proved: the hardware looked as good as everyone had been expecting, but the battery lasted hardly a day, for which Motorola was rightly lambasted.

Since then, the manufacturer has issued a software update that has improved the situation: in our real-world experience, we found the Moto 360, with the latest firmware, tended to last a little over 24 hours before the battery needed a top-up. That's still not brilliant, though. In our notifications test, it came bottom of the battery-life table with a projected score of 27 hours – a long way behind the 50-hour LG G Watch.

What's to blame? We suspect it has something to do with the 360's processor, a four-year-old, 45nm TI OMAP chip that's also responsible for the slightly stuttery performance. Other Android Wear watches are based on more modern, efficient components, and the benefits are clearly evident.

That's a shame, because in many ways the Moto 360 is a fantastic piece of kit. Design-wise, it's stunning. Some may not get on with the thickness of the watch – it stands 11.9mm proud of your wrist – but the sharp styling, comfortable leather strap, circular face and edge-to-edge

▼ The Moto 360 is the only smartwatch on test here with a circular design



screen really make a statement. It looks great in all-black, as pictured, but the silver model with the grey strap looks even better, we think.

The 320 x 290-resolution IPS screen is a triumph – it's the brightest, and most readable in sunlight (aside from the monochrome Pebble Steel), with a sensor that dials down the brightness when it isn't needed.

The Moto 360 also has a heart-rate monitor that, in conjunction with the preloaded Motorola activity-monitor app, keeps tabs on your ticker whenever it detects you're partaking in physical activity. Just like the steps history shown by most Android Wear devices, it can track your pulse over the course of a week. As on other smartwatches with optical heart-rate sensors, you have to be sitting or standing still to take a one-off reading, but it seems pretty accurate.

With an IP67 rating, the Moto 360 is also water-resistant to 1m for 30 minutes. We wouldn't advise going swimming while wearing it, but it will shrug off a rain shower. A final point to praise is the Moto 360's support for Qi wireless charging.

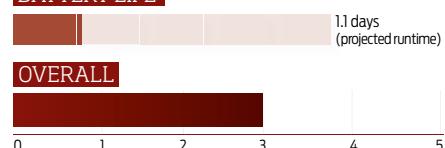


◀ Motorola deserves praise for including a Qi wireless charging cradle

Unlike the rest of the watches on test, it can charge from any compatible wireless charging pad or cradle. We love the alarm-clock mode, too: drop the watch sideways onto the supplied cradle and the watch face rotates and turns on, with a blue line around the perimeter indicating how full the battery is.

There's plenty to like about the Motorola Moto 360, then. It has all the features you'd expect, a fantastic design, a lovely screen and some extra qualities that elevate it above the competition. However, it isn't cheap, and that worst-in-class battery life inevitably pushes it down the overall pecking order.

BATTERY LIFE



Samsung Gear 2

THE FIRST ANDROID WEAR SMARTWATCH IS BASIC, BUT IT'S REASONABLY PRICED AND OFFERS A LARGE BATTERY

It's tough to tell the Samsung Gear 2 and Gear Live apart at a glance, but don't be fooled – they're quite different devices. The big difference is in the operating systems they run – the Gear 2 uses Samsung's Tizen platform rather than Google's Android Wear, and is restricted to working with only a select group of Samsung smartphones.

The Gear 2 comes in a choice of silver or bronze colourways, and the shapely metal body frames a 1.63in AMOLED touchscreen with a 320 x 320 resolution. It isn't as bright as the LCD-based screens here, and nowhere near the brightness of the Motorola Moto 360's gleaming, circular display, but the Samsung's crisp panel is noticeably more colourful and vibrant. There's no ambient light sensor, though.

In a novel twist, Samsung has included a 2-megapixel camera and an infrared transmitter for controlling TVs, set-top boxes, or even compatible air-conditioning units. Sadly, the camera's forward-facing position means that it isn't possible to conduct video chats directly on your wrist: it's only for taking low-res, grainy snaps.

On the rear, there's a heart-rate sensor that's capable of taking both one-off and continuous readings, and the micro-USB adapter clips on to provide charging via

✓ Uniquely, Samsung has found room for a 2-megapixel camera in the frame



a USB cable or with the supplied mains charger.

Look past the attractive exterior – which, like many of its rivals, is IP67-rated to survive accidental soakings – and the Gear 2 has much in common with the cheaper Gear Neo. Inside, it's powered by a 1GHz Exynos 3250 CPU and 512MB of RAM, and there's 4GB of internal storage.

The Exynos delivers enough oomph to keep things feeling responsive, and battery life is better than average: the Gear 2 outlasted every smartwatch other than the Pebble Steel in our notification test, and often made it through two days in everyday use.

Using the Gear 2 isn't hugely dissimilar to any of the Android Wear watches we've tested. Notifications pop up on screen and can be acted upon with a tap or swipe of a finger. The principal difference is that the Gear 2 is more overtly a standalone device. With a built-in launcher and a series of preloaded apps, it feels much more like using a mini smartphone. It's even possible to listen to music stored on the watch



◀ The micro-USB adapter clips on to provide charging via USB or the mains

itself via a Bluetooth headset.

Also, unlike many of its rivals, the Gear 2 allows you to answer calls by speaking directly into your wrist, using the S-Voice app.

The Gear 2 simply doesn't deliver where it should. We're not fans of the limited compatibility, and Tizen doesn't feel as polished or useful as Android Wear or Pebble OS in everyday use. The killer blow, though, is landed by its own stablemate: with the Gear 2 Neo delivering all the same features, bar the pointless camera, for much less cash, the Gear 2 simply misses the mark.

BATTERY LIFE



OVERALL



Samsung Gear Live

SAMSUNG REWORKS ITS GEAR 2 SMARTWATCH WITH ANDROID WEAR - AND THE RESULT IS BOTH ALLURING AND AFFORDABLE

It was inevitable that Samsung would dip its toe in the waters of Android Wear, and the handsome result is the Gear Live. In design terms, it shares an uncanny resemblance to Samsung's Tizen-based Gear 2 and Gear 2 Neo watches, partnering Google's OS for wearables with an attractive, square-faced design.

The Gear Live lacks the wow factor of the Motorola Moto 360, but it's far from ugly. There's the same smart-looking border of metal running around the 1.63in, 320 x 320 AMOLED display as found on the Gear 2, and the smoothly curved edges and arched plastic rear make for a watch that looks good and feels comfortable on the wrist. It's tough, too: the Gear Live's IP67 rating means it will shrug off everything from rain showers to sweaty bike rides.

Look more closely, however, and the Gear Live sports a few key differences to its stablemates. There's still an optical heart-rate monitor at the rear, but it's less flexible: it can take only one-off readings and can't continually monitor your pulse. The infrared transmitter and built-in camera are conspicuous by their absence, and the integrated microphone isn't partnered by a speaker, so answering calls

✓ The design is similar to the Tizen-based Gear 2



directly on the watch is out of the question – only voice control and message dictation via Google Now is possible.

The Gear Live's display serves up punchy, colourful images and crisp-looking text. And although it loses out to the Moto 360 in our brightness tests – we measured the OLED panel's maximum brightness at a mediocre 284cd/m² – its perfect contrast serves it well.

Working behind the scenes is a single-core 1.2GHz Qualcomm Snapdragon 400 CPU with 512MB of RAM and 4GB of flash storage – a carbon copy of the hardware in the LG G Watch. This isn't a criticism, though: it's potent enough to avoid lag or stutter in the Android Wear interface, and we encountered no serious problems during our testing.

Where the Gear Live lets its guard down is endurance. The 300mAh battery is smaller than all the other Android Wear devices here, and battery life isn't great. In our five-minute notification test with the screen set to time out, it lasted only 36

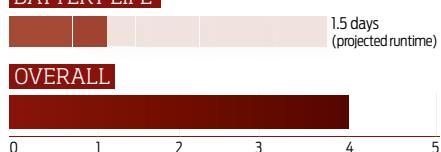


◀ The clip-on micro-USB charger is small and far too easy to lose

hours – well off the pace of most rivals. We're not huge fans of the clip-on micro-USB charger, either. It mounts securely to the rear of the watch, but its tiny size makes it far too easy to lose.

Despite its flaws, the Samsung Gear Live represents the best balance of features, performance and price among the Android Wear devices we've tested here. With the smartwatch market set to hot up over the coming months, that verdict will inevitably change, but if you're itching to take the plunge right now, the £169 Gear Live represents a solid introduction to the world of Android Wear.

BATTERY LIFE



Samsung Gear 2 Neo

THE BEST OF SAMSUNG'S TIZEN OS WEARABLES - AND MORE VERSATILE THAN ITS ANDROID WEAR RIVALS

If your memories of schoolrooms and Greek lessons are still fresh, you'll know what to expect from the Gear 2 Neo: this is Samsung's junior Tizen OS wearable, the affordable student to the Gear 2's master.

Visually, it isn't hard to spot the difference between the smartwatches. The Gear 2 Neo swaps the brushed-metal body for plastic, and it clearly looks the cheaper device. That said, it's still IP67 protected against dust and water ingress, and it's anything but unattractive.

The family resemblance is obvious, with the familiar 1.63in, 320 x 320-resolution AMOLED screen curving very slightly at its edges, and the plastic housing rolling smoothly off into the textured wristband.

This wristband, apart from its textured pattern, is identical to the Gear 2's: there's the same dual-prong fastener married to a metal latch, which folds over and clicks into place. It's secure, but it does occasionally dig into the wrist.

Once you get past the slightly different exterior and strap, however, there's little to separate the two watches. The only thing



▲ Despite the price difference, the Gear 2 Neo is much like the Gear 2

missing is the camera, which is no great loss. Otherwise, the infrared transmitter and heart-rate monitor make the cut; the internal specifications are the same; and it can do everything its bigger brother can.

We even found that battery life was the same in our notifications test. A runtime of just over two days placed it only fractionally behind its sibling.

You have to wonder what Samsung was thinking, making a smartwatch that was largely equal to its flagship Tizen device at a much lower price. The Gear 2 Neo is an interesting proposition, and if you have a supported Samsung smartphone it's worth considering. Since it won't work with other phones, its appeal is limited.

BATTERY LIFE



OVERALL



Samsung Gear Fit

SAMSUNG BLENDS THE TWIN WORLDS OF SMARTWATCH AND FITNESS BAND - BUT THE GEAR FIT ISN'T BRILLIANT IN EITHER ROLE

Samsung's Gear Fit is the odd one out this month. Part smartwatch and part fitness band, it's designed to straddle the divide between sports wearables such as the Fitbit and fully fledged smartwatches.

Unlike the more traditional-looking watches here, the Gear Fit has a curved rectangular display – and it's gorgeous. Measuring 47mm from corner to corner, the crisp, 432 x 128 AMOLED touchscreen drips with rich colours.

The Gear Fit runs on Samsung's own real-time OS, RTOS, and although this isn't as advanced as Tizen or Android Wear, it provides a range of basic smartwatch functions, such as displaying email, text and call notifications, as well as a range of exercise features. Compatibility is restricted to a few Samsung phones, but there's one big benefit to the lightweight OS: battery life stretches to two days, impressive for such a compact device.

There's an optical heart-rate sensor that captures one-off and continuous

readings, and the 210mAh battery charges via a micro-USB charger. Don't expect voice control, though.

Exercise is the Gear Fit's focus. It uses its built-in accelerometer, gyroscope and

> The 432 x 128 AMOLED touchscreen looks gorgeous



heart-rate sensor to monitor your daily exercise levels. This data can be fed to apps installed on a paired smartphone, and the pedometer can record your runs and walks.

Sadly, neither the distance or heart-rate readings are reliable. You have to pair the Samsung with a smartphone for accurate GPS tracking, and we noted large discrepancies between it and the heart-rate straps we use for our daily workouts – at flat-out pace, the Samsung often gave unbelievably low readings.

The Gear Fit is neither a convincing smartwatch nor an effective fitness tool. We love the concept, but it's back to the drawing board.

BATTERY LIFE



OVERALL



View from the Labs

JONATHAN BRAY WELCOMES THE ARRIVAL OF THE SMARTWATCH – BUT WARNS THE INDUSTRY NOT TO GET AHEAD OF ITSELF

In the past few years, I've gradually grown out of wearing a watch. My phone tells me the time perfectly well and, as an added bonus, it also keeps me in contact with work and friends, and entertains me in moments of boredom.

As a result, I've been sceptical about smartwatches from the very beginning. Why would I need an additional gadget strapped to my arm when the one in my pocket already does the job so well?

During the course of this Labs, however, I've well and truly fallen back in love with the watch.

I've come to realise there's nothing quite like being able to check the time with a quick flick of the wrist. When I'm rushing around in the morning, every second counts in the military operation that is getting the kids to school, and glancing down at a watch is so much more convenient and natural than digging a phone out of a pocket –

assuming it's even there, rather than connected to a charger somewhere else in the house.

It isn't all about timekeeping, though; it's the ability to be instantaneously notified of important incoming communications, from phone

calls to text messages and even Facebook updates, that's finally persuaded me that smartwatches are here to stay. I've lost count of the number of phone calls and text messages I've missed over the years because I'd

accidentally left my phone in silent mode, or charging in another room. With a Pebble Steel or Moto 360 on my wrist, I now know immediately when someone's trying to get in contact.

It's been such a revelation that I'm considering buying one, not only for myself, but also for my wife, who answers

"The Android Wear and Samsung devices may do more things than the Pebble Steel, but they just don't last long enough"



▲ The Pebble Steel lacks frills but works beautifully

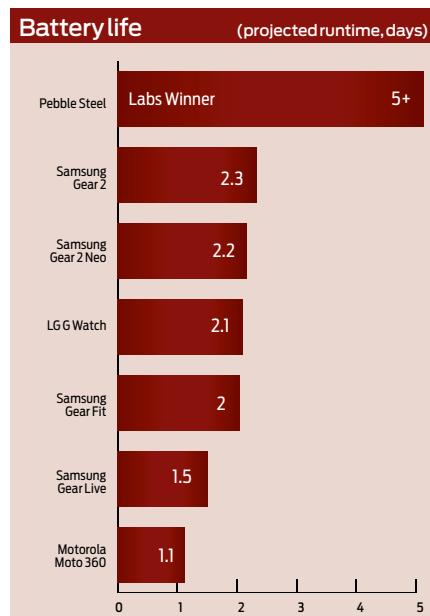
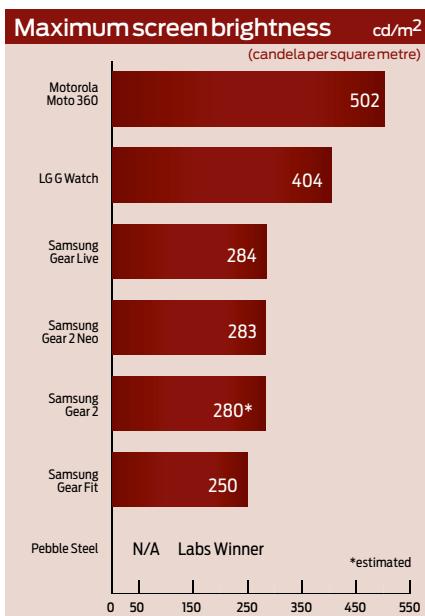
her phone one time in six when I call – not because she doesn't want to talk to me (although that does happen on occasion) but simply because she can't hear her phone when it's buried at the bottom of her bag.

If this is a positive endorsement of the brave new world of smartwatches, however, let it also serve as a warning to manufacturers. In order to be genuinely useful – an indispensable aid rather than a quirky nuisance – a smartwatch needs to spend as much time on its owner's wrist as possible. It can't be something that continually needs to be removed and recharged. The worry at the moment is that most of the smartwatches you can buy fall into this category. You get one to two days of typical use out of them, but after that you'll be rummaging around looking for your charging clip, then waiting for it to replenish itself.

In fact, the only smartwatch that I've tested that doesn't irritate me in this fashion is the Pebble Steel, a factor that played a large part in its winning the overall Labs Winner award this month. The Android Wear and Samsung devices may look more exotic and do more things, but they just don't last long enough.

As smartwatches evolve, manufacturers need to remember that longer battery life is not merely an optional extra with a smartwatch, but the very essence of what makes it useful. When manufacturers crack that conundrum – and it may well involve making some compromises on screen technology and features – the smartwatch market will explode. As yet, it's still a ticking time bomb. ●

Test results



NEW



**THE ORIGINAL HIGH PERFORMANCE NOTEBOOK
NOW SLIMMER, LIGHTER & MORE POWERFUL**

- NVIDIA GeForce GTX 970M OR 980M
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BlackBook Range



Welcome to Upgrade Australia

DAVID HOLLINGWORTH has a PC that is, basically, three years old. It's time to upgrade, and he knows he's not alone...

We're kicking off something special this month. A grand project between all our enthusiast technology and gaming titles; a project that will let us, and our partners, share one, over-arching goal with our readers. We want Australia to upgrade - their PCs, their storage, their networks, any piece of technology that may be lying around... Out with the old, in with the new, that's the motto of Upgrade Australia, and you can follow it through *Hyper*, *PC & Tech Authority*, *PC PowerPlay* and *Atomic* online.

SO WHAT IS IT?

It's six months of hardware advice and recommendations from our most trusted partners, in our print publications and online, and it all culminates in a very special technology event next year, where it will all come together, and where you get to interact directly with the best tech brands and products in the industry. So, without further ado...

LOOKING FOR A GIFT FOR A LOVED ONE?

We've all been there, leaving Christmas presents to the last minute. But just because you're a bit late to the party, doesn't mean you can't deliver some great new tech to your friends and family. Here's three great gifts, powered by Intel, that no one could fail to enjoy!

ASUS T-100

ASUS' Transformer range is not unlike the popular toy - it's a 2-in-1 device that serves as either an ultraportable laptop PC, or you can remove the screen and convert the machine into a handy tablet form-factor.

With a full-size keyboard it's great for creating content or writing. It's also very light and thin. It's 16:9, IPS display delivers a pleasing 1366x768 HD resolution, and with a wide viewing angle it can be enjoyed by a crowd. And with Intel's Bay Trail quad core processor under the hood, it's a powerful steal at only \$449.



ACER ICONIA ONE 7 TABLET

Acer's 7in Iconia packs a lot of power into slim - and highly colourful tablet. With a quad-core processor, and an IPS HD LCD display, any content will look great and run flawlessly. It's light, easy to use anywhere, and boast battery life of up to seven hours, meaning less time between charges.

Powered by the easy-to-use Android operating system, Acer adds an anti-fingerprint coating, and Touch WakeApp, so that you can use one-touch gestures to start your tablet and get right into whatever app you wish to use.

At just \$199 from Harvey Norman, it's a great way to give a bit of versatile computing to someone you love.



PENDO PAD 7

If money is a bit more of an object, it is in fact possible to pick up a tablet that is a true stocking filler. The Pendo Pad 7, available at Coles for just \$89, runs Windows 8.1, and comes complete with Office 365 Personal included - that's worth the price of the Pad alone!

For that low price (and it's selling fast, so get in quick!), you get an Intel Atom processor, and access to the full Windows App Store, and 16GB of flash memory to store photos, documents, music, and more.



TOUGHPOWER DPS-G



DIGITAL MONITORING

The DPSApp software allows you to monitor exactly how much power your PC is using as well as the efficiency of the system when it's engaging in different activities, such as playing games, browsing the internet, editing photo's or checking email. Through digital control and adjustment you get unmatched control and adjustment for efficiency and can easily monitor just how efficient your systems voltage is running across any scenario.



80 PLUS GOLD AND HASWELL READY

Our Toughpower DPS G Power Supply delivers between 87%-92% efficiency under real-world load conditions, promising the lowest power losses.

In addition, the DPS G Series has been optimized to work with Intel's new fourth-generation Haswell processors to achieve maximum energy savings.



7 YEAR AUSTRALIAN WARRANTY

The Toughpower DPS G Series is built with industry leading quality control and specifications. This product includes state of the art Over Voltage control and Short-Circuit protection.

Our 7 Year Manufacturer Warranty ensures you have peace of mind. We have high confidence that our DPS G Series PSU will provide you years of enjoyment and unmatched reliability.

AVAILABLE IN • 1050W • 850W • 750W • 650W



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COOL ALL YOUR LIFE

www.thermaltake.com.au



SYNOLOGY DISKSTATION DS115J

With the Synology DiskStation DS115j, a comprehensive network-attached-storage (NAS) solution doesn't cost what the feature-list dictates it should.

The one-bay (max 6TB storage) DS115j combines practical versatility with a budget-friendly \$129RRP in a compact offering that's as quiet as it is energy efficient. It boasts 102.89MB/s read and 61.59MB/s write speeds, which makes it the logical choice for personal backup, file sharing and multimedia streaming.

DLNA certification makes it a cinch to intuitively access photo, music and video files in a single place, while comprehensive network protocols facilitate seamless sharing across Windows, Mac and Linux operating systems.

An inbuilt floating-point unit provides on-demand audio track transcoding and speedy thumbnail generation for faster picture perusal. Local use is just the beginning, though, as clever QuickConnect technology simplifies global access to your DS115j by way of desktop utilities and/or mobile apps, as Cloud Sync automatically keeps your DiskStation in sync with software including Dropbox, Google Drive and Baidu.



SYNOLOGY DISKSTATION DS215J

Satisfy your NAS needs with a Synology DiskStation DS215j drive. This two-bay NAS emphasises file security, while providing an impressive list of features to enhance your digital life, all at a low entry price of \$239RRP.

The DS215j packages everything that's impressive about the aforementioned DS115j and pushes it further with 110MB/s read and 80MB/s write speeds powered by a dual-core 800MHz CPU. These speed increases don't equate to additional heat or sound, either, thanks to a 92x92mm fan and clever airflow system, while intuitive hard-drive hibernation further reduces power consumption, which means minimal impact on your energy bill.

User-friendliness is also a key pillar of the DS215j experience, with a variety of Synology-specific technologies that make the DiskStation effortless to use. File Station offers a web-based file explorer via encrypted FTP server, and Cloud Station syncs files across PC, Mac, Linux, iOS and Android devices. Photo Station simplifies picture organisation and sharing, while Audio Station provides internet radio, DLNA, AirPlay and Bluetooth-speaker playback options.

Own the satisfaction of a high-performance, feature-rich NAS with the DS215j.

SYNOLOGY DISKSTATION DS415PLAY

If you need versatility, reliability and storage-expansion freedom from your NAS, you need the Synology DiskStation DS415play. The four-bay DS415play is powered by a dual-core 1.6GHz CPU and 1GB of RAM for blistering read/write speeds of 112MB/s and 101MB/s, respectively, at a \$639RRP.

With a maximum storage potential of 24TB, the DS415play is purpose-built to consolidate all of your multimedia collections for centralised sharing. This DiskStation device is optimised for multimedia playback, with bragging rights to seamless multimedia streaming across a wide range of gadgets. Best of all, lovers of pristine visual fidelity can take advantage of the DS415play's hardware-accelerated 1080p Full HD video transcoding capacities, effortlessly sharing videos with PCs, mobile devices, network media players and smart TVs.

There are two USB 2.0 and two speedy USB 3.0 ports for transferring data or attaching additional storage peripherals, while the impressive hardware offering is kept cool with 92x92mm fans combined with a noise-dampening design to keep NAS operations unobtrusively quiet.



Company of Heroes 2: Ardennes Assault

SOME CLEVER FORMULA TWISTS MAKE FOR THE BEST SOLO OUTING FOR THE FRANCHISE, BUT IT'S NOT WITHOUT SOME UNFORTUNATE FLAWS

For an exclusively single-player outing, Company of Heroes 2 latest batch of DLC, Ardennes Assault, sure plays like intermediate multiplayer training. The Soviets take a back seat to the plight of the US Forces during Nazi Germany's last desperate push of World War II: the Battle of the Bulge.

This is familiar territory to fans of the original Company of Heroes, and even more so for anyone that's played the last round of DLC, The Western Front Armies, as the playable US Forces faction is identical. What's refreshingly different is the experimentation with the single-player formula. Three companies are selectable with different proficiencies, the catch being there are only three companies available anyway, unless you want to dabble in purchasing another option via micro-transactions. Then you're thrown into the thick of things, with a steep learning curve,

even if you complete the bare-bolts initial training mission.

Controversially, Relic has stripped the convenient option to save and reload within a mission, which meant that my risky tactics were often dynamically countered by the cunning enemy AI, and I even had to completely restart more than once to ensure victory. You can still select the 'Save and Quit' option, but because you have to reload the mission to restore your point, it encourages you to stay in the battle overall.

Couple this with the reality that losses inflicted in a mission eat away at a company's overall unit count, restricting your potential for reinforcement, and Relic has made some smart choices for rewarding tactical play and punishing rush/retreat strategies.

There's also a between-mission Total War-like map overview, which is



technically turn-based, but the Nazis never seem to get a turn. It lets you upgrade and reinforce your companies, but it could have been taken further.

Ardennes Assault marks the best presentation of the Company of Heroes 2 single-player formula, to date. It serves as a shiny set of training wheels for those interested in tackling the steeper learning curve of competitive multiplayer in the core game or recent The Western Front Armies DLC.

Nathan Lawrence

KEY SPECS

www.sega-australia.com

Genre - Strategy · Developer - Relic Entertainment · Publisher - SEGA · PC only

OVERALL



Wasteland 2

A SEQUEL WE HAVE WAITED 26 YEARS FOR

One of the shining lights of the crowdfunding movement, Inxile's Wasteland 2 is an attempt to return to the turn based, isometric computer role playing game of days gone by. It is also the official sequel to an iconic game that was made way back in 1988, and while it may be drawing a pretty long bow to say it has been worth the wait, Wasteland 2 certainly succeeds in its aims.

Set a century from now, in an alternate timeline that had a nuclear apocalypse wipe out much of civilization in the late nineties, the game puts you in charge of a team of four Arizona Rangers, a militia group formed to keep the peace in the titular wasteland. Over the course of the

game you make your way through the Arizona wasteland and eventually end up in Los Angeles, encountering everything from ultra-violent religious orders through to cyborg armies and a group of etiquette zealots who look unkindly on the impolite.

While the story is highly entertaining as it twists and turns its way through the game, where Wasteland 2's biggest strength lies is in the way you affect the story through your decisions. Because Inxile has focused on delivering conversations as text rather than blowing budgets hiring Nolan North to read the lines out loud, it has been able to pack a lot more into the game, allowing the story to branch and for the decisions you make to echo throughout the dozens

of hours of gameplay it delivers.

This does mean wading through a lot of text, but it is a refreshing step back to an era before games were spoon fed to the audience, and the game is much better for it. It isn't perfect - and by its very nature will be an instant turn off for some gamers with little patience for reading or micromanaging seven characters worth of inventory, but the joy of crowdfunding means that doesn't matter.

Wasteland 2 is an unashamed step back to what many consider the Golden days of the RPG, built for modern PCs, but full of all the things that made many of us fall in love with games in the first place. An excellent way to lose a few days gaming.

John Gillooly

KEY SPECS

www.wasteland.inxile-entertainment.com

Genre - RPG · Developer - Inxile · Publisher - QVS · PC only

OVERALL



Borderlands: The Pre-Sequel!

BOUNCY MOON GRAVITY AND THE USUAL MILLIONS AND MILLIONS AND MILLIONS OF WEAPON TYPES MAKE THIS AN AUSSIE-MADE BIT OF GENIUS.

When Australian developer 2K Australia (formerly Irrational Games) was charged with development of Borderlands: The Pre-Sequel, fans of the franchise made their worries unknown. The last game Gearbox released that had been outsourced to a third-party developer was the disastrous Aliens: Colonial Marines, so this trepidation wasn't necessarily unfounded. As it turns out, fans needn't have worried about the future of the series at all, as 2K Australia has delivered a game that feels right at home in the franchise. Borderlands: The Pre-Sequel doesn't reinvent the franchise but it definitely adds enough to make it feel fresh and wonderfully playable. It's also wonderfully Australian, with the humour having a much more local flavour than seen in the previous, America-centric iterations.

The four new characters introduced



form the most diverse roster seen in the games so far, with each playing remarkably differently. Each of the characters has appeared in previous Borderlands games or DLC, giving them not only a history but in some cases a future, making them the most compelling anti-heroes seen so far. Nisha, last seen as Handsome Jack's girlfriend and sheriff of Lynchwood in Borderlands 2 is very much a glass cannon character, capable of dealing huge amounts of damage in a short period of time but lacking in too many defensive options. Wilhelm, last seen as one of the boss encounters in Borderlands 2 slowly becomes more cybernetic with each additional skill point. Athena comes from the Armoury of General Knoxx DLC from Borderlands and comes equipped with a shield that can be used to block attacks and thrown like Captain America's signature weapon. The roster is rounded out with Claptrap, everyone's favourite (or most hated) friendless robotic annoyance. In keeping with his character, Claptrap's skills are geared towards trying to impress his "friends" and the psychotic violence that stems from him being so disliked. Unlike previous games, each of the characters is voiced, so have much more input when it comes to mission dialogue, further helping to round them out.

The general formula for Borderlands remains a constant in the Pre-Sequel, an understandable decision when you take into account the fact that the game falls between the events of the first and second game, with players taking quests, exploring the moon of Elpis, killing monsters for bigger and better guns and using said guns to kill more challenging baddies. It's



not all more of the same, however. The new locale of Elpis brings with it two new features that really switch up how the game is played. There is no oxygen on the moon, so players have to equip themselves with O2 masks. Killed enemies often drop O2 bottles, changing up the pace of combat, as making sure you have enough oxygen is as important to survival as monitoring health and shields. Oxygen can also be used in movement. Venting O2 allows players to double jump or slam into the ground causing damage to anyone in the area of effect. This change in movement really changes up the feel of combat, making it a much more dynamic affair, with mobility prioritised over cover.

The game is not without its flaws. Travel times and backtracking, two of the faults that have plagued the series since its inception, have been exacerbated by the expanses of the moon. There are a number of missions that shout out to those seen in the previous two games, but due to the narrative positioning of the Pre-Sequel they come across less as a tribute than a knockoff. Even with these few misgivings, the Pre-Sequel is a fun and often hilarious return to the Borderlands universe.

Dan Wilks

KEY SPECS

www.borderlandsthegame.com

Genre - Action • Developer - 2K Australia • Publisher - 2K Games • PC, Xbox 360, PS3, Linux/Steam OS, OS X

OVERALL



The A-List

ONLY THE BEST OF THE BEST MAKE IT TO PC & TECH AUTHORITY'S A-LIST

Rejoice, tablet fans and smartphone lovers, for there be new kings. The dazzling Sony Xperia Z3 Compact is the new smartphone champ. Head off to our comprehensive review starting on page 38 to see why Sony is back in the game with a gem of a smartphone.

And it almost comes as no surprise that Apple's new iPad Air 2 is the new best tablet. Try as they might, the Android opposition can't quite match the slick overall package that we see with the new Air. Our review is on page 34, so have a read of that to see what all the fuss is about.

In other news, there's no news on the Security front... yet. It's a bit odd having a '2014' product (Kaspersky, in this case) here, now. But we always do a deep Security software group test early in each new year so we'll have that updated once testing is complete.



PC DESKTOP

ALL-IN-ONE

Apple iMac 27in



PRICE \$2199

SUPPLIER www.apple.com.au

If you can afford it, the 27in iMac is the finest piece of all-in-one engineering on the market. A truly powerful beast with performance to match its looks.

SPECIFICATIONS 3.2GHz quad-core Intel Core i5; 8GB DDR3 RAM; 1TB Western Digital Caviar Black HDD; NVIDIA GeForce GT 750M 1GB; 27in 2560 x 1440 LCD.



PERIPHERALS

WIRELESS ROUTER

Netgear Nighthawk X6 AC3200



SUPPLIER www.netgear.com.au

Designed to keep pace with high-bandwidth content consumption, it is the router King.

SPECIFICATIONS 1GHz dual core processor with 3 offload processors, 6 High performance antennas, one 2.4GHz band and two 5GHz Wi-Fi bands

DESKTOP STORAGE

Seagate 2TB Backup plus desktop



SUPPLIER www.seagate.com

This 2TB external drive still offers good value despite the rise of higher-capacity drives. The USB 3.0 adaptor makes for excellent transfer speeds.

SPECIFICATIONS 2TB external hard disk with NTFS; USB 3.0, with other docks available as optional; 44 x 124 x 158mm 894g.

NAS

Synology Diskstation DS214play



SUPPLIER www.synology.com

The fastest NAS in our grouptest (PC&TA 197), with excellent media streaming capabilities.

SPECIFICATIONS 2.1GHz Intel Atom; 2GB RAM; 2 x USB 3 + 1 x USB 2; iOS and Android mobile apps; RAID 0, 1, 5, 10; JBOD.

ALL-IN-ONE PRINTER

Canon Pixma Mg5460



SUPPLIER www.canon.com.au

The winner of our most recent printer grouptest, this combines excellent print quality with decent costs and is just as good at printing photos as it is documents.

SPECIFICATIONS 9600 x 2400dpi print; 2400 x 4800ppi scan; USB; 802.11n WLAN; 125-sheet tray; 455 x 369 x 148mm

LASER PRINTER

Dell B1160w



SUPPLIER www.dell.com.au

The best all-rounder in our printer grouptest, with excellent text printing and decent costs.

SPECIFICATIONS 1800 x 600dpi resolution; USB 2; Wi-Fi; 150-sheet input trays; 331 x 215 x 176



LAPTOPS



VALUE

Asus TF103C



PRICE \$429

SUPPLIER www.asus.com.au

While ostensibly a tablet with a removable keyboard, it also fits tidily into the value portable category thanks to its immense usability and remarkably low price.

SPECIFICATIONS Quad-core 1.86GHz Intel Atom Z3745 · 1GB RAM · 8GB/16GB eMMC storage · 10.1in 1,280 x 800 IPS display · dual-band 802.11n Wi-Fi

PERFORMANCE

Aorus X7



PRICE \$2999

SUPPLIER www.aorus.com

Super-sleek, light, outrageously powerful and with a spec-list that outclasses many high end desktop systems.

SPECIFICATIONS Q4-3.4GHz i7-4700HQ · 4GB/8GB DDR3L 1600, 4 slots (Max 32GB) · 17.3" Full HD 1920x1080 · NVIDIA® GTX 765M SLI GDDR5 4GB · mSATA 128GB/256GB · 2slot 2.5" HDD 500GB/750GB/TB 5400rpm

PROFESSIONAL

Apple Macbook Retina



PRICE \$3199

SUPPLIER www.apple.com.au

The machine that does everything right, and looks the part, too. We've chosen the top-end 2.3GHz i7 model with 16GB of RAM and a 512GB SSD plus GT 750M graphics.

SPECIFICATIONS 2.3GHz Intel Core i7; 16GB RAM; 512GB SSD; 15in 2880 x 1800 LCD; 1x USB 3; 2x USB 3; 2x Thunderbolt 2; dual-band 802.11abgn Wi-Fi; Bluetooth 4; 3G



ULTRA PORTABLE

Microsoft Surface Pro 3



PRICE \$1549

SUPPLIER www.microsoft.com.au

Attach the Type Cover 2 and it's as good, if not better, than any 'proper' ultra portable laptop. It took three versions, but Microsoft has nailed this format. At least an i5 is recommended.

SPECIFICATIONS 1.9GHz Intel Core i5-4300U; 12in touchscreen (2160 x 1440); 8GB RAM; 256GB SSD; 802.11ac/bgn; Bluetooth 4

HANDHELDS

SMARTPHONE

Sony Xperia Z3 Compact



PRICE \$699

SUPPLIER www.sony.com.au

In short, no other smartphone offers the same level of performance and features at this price.

SPECIFICATIONS 2.5GHz Qualcomm Snapdragon 801 SoC · 2GB RAM · 16GB storage · Adreno 330 graphics · 4.6in 720 x 1,280 IPS display

NEW



TABLET

Apple iPad Air 2



PRICE \$539

SUPPLIER

www.apple.com.au

The iPad Air 2 is definitely the best tablet on the market right now, and rightfully replaces its predecessor on our A-List.

SPECIFICATIONS 1.5GHz Apple A8X SoC · 2GB RAM · 16/64/128GB storage · 9.7in 1,536 x 2,048 IPS display · 7,340mAh battery

NEW



EBOOK READER

Kindle



PRICE \$109

SUPPLIER

www.amazon.com

The new model is quicker, slimmer, lighter and cheaper than before. If all you want to do is read books, its simple design and performance are perfect.

SPECIFICATIONS 6in e-Ink screen, 170g weight, 114 x 8.7 x 166 mm, 2GB memory, 10-day battery life. WEB ID 279534



SOFTWARE

SECURITY

Kaspersky Internet Security 2014



SUPPLIER www.kaspersky.com.au

The winner of this year's security software group test, a big improvement over recent years, and a good solution for beginners and more advanced users. Kaspersky AV software runs well on even low-end machines, and operates relatively seamlessly and with a small memory and OS footprint.

BACK UP

Acronis true image 2015



SUPPLIER www.acronis.com.au

Still our go-to solution for backing up, the new 2015 version adds full-system backup and dual backup (local and cloud) and unlimited cloud storage!

OFFICE SUITE

Microsoft Office 365 Home Premium



SUPPLIER www.microsoft.com.au

The easiest to use Office to date.

WEB DEV

Adobe Dreamweaver CS6



SUPPLIER www.adobe.com.au

This edition makes PHP and CMS its core focus, which gives it the new lease of life it so desperately needed.

AUDIO

Cubase 7.5



SUPPLIER www.steinberg.net

The addition of better filters solidifies this program's continued place on the A-List.

VIDEO

Sony Vegas Movie Studio HD platinum 11

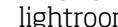


SUPPLIER www.sony.com.au

May not have the bells and whistles of other consumer editing packages, but its tools are efficient.

PHOTO

Adobe Photoshop lightroom 5



SUPPLIER www.adobe.com.au

An excellent tool for photo management and light editing, as used by the pros and now available at a very reasonable price.

The Kitlog

SYSTEMS FOR A REASONABLE GAMING BUDGET, AND AN UNLIMITED DREAM MACHINE THAT CAN TACKLE ANYTHING.

This month's power supply group test yields two new components. For the Game Box we've added Cooler Master's G750M, which delivers extremely reliable power at just \$125.

Over in fantasyland, our Perfect PC picks up Corsair's beastly HX1000i, which impressed us in testing with its flawless power delivery, and as a bonus comes with the excellent Corsair Link digital monitoring feature.

THE GAME BOX

CPU



INTEL CORE i5 4670K

PRICE \$275

Gamers can do without Hyperthreading and save \$100 or more, compared to an i7. The K version is unlocked for easier overclocking.

MOTHERBOARD

ASUS ROG RANGER

PRICE \$259

Fully featured, extremely well engineered. Alternatively, the MSI Gaming 7 or Gigabyte Z97X-UD5H are equally as good at the same price.



MEMORY



KINGSTON HYPERX BEAST 16GB

PRICE \$240

Our roundup award winner, it's well-priced, fast and overclocks very well.

VIDEOCARD

NVIDIA GTX 970

PRICE \$500

Quiet, sips power, but when the performance is needed this blazer eats up the frames.



THE PERFECT PC

CPU



INTEL CORE i7 4970K

PRICE \$400

Intel's top-of-the-line quad-core i7 delivers huge performance and can overclock easily to around 4.7GHz with the K version.

MOTHERBOARD

ASUS Z97 DELUXE

PRICE \$485

Plenty of cutting-edge technology crammed into this package. It's for those who want it all in a LGA1150 system.



MEMORY



CORSAIR DOMINATOR PLATINUM CMD32GX3M4A2133C9 32GB

PRICE \$619

These memory chips are hand selected and tested, and 32GB of fast RAM will keep things smooth and fast in intensive tasks.

VIDEOCARD

NVIDIA GTX 980

PRICE \$800

It's a pure powerhouse, with the fastest single-GPU performance available today, and with support for advanced lighting and VR.



TOTAL: \$2977 RIG ONLY: \$2248

COOLER	 <p>COOLERMASTER NEPTON 140XL PRICE \$140 Easy to install AIO CPU cooling, relatively quiet and performance to rival twin-radiator units.</p>	CASE	 <p>BITFENIX RONIN PRICE \$99 Bitfenix continues to deliver great budget cases that look terrific and are easy to build in.</p>
SYSTEMDRIVES	 <p>SAMSUNG 840 EVO 250GB PRICE \$190 Super-fast, cheap and space for the OS and your games.</p>	KEYBOARD	 <p>CORSAIR K70 PRICE \$160 The glorious perfection of mechanical keys with well thought-out gamer design.</p>
DISPLAY	 <p>LG IPS277L PRICE \$400 27 inches of IPS glory. The resolution isn't perfect, but the price is. The thin bezel makes this a very attractive screen.</p>	MOUSE	 <p>TT SPORTS VOLOS PRICE \$89 The easy first choice at PC&TA HQ where we play hard and test every mouse. Also superb value.</p>
AUDIO	 <p>TT ESPORTS CRONOS PRICE \$80 Fantastic set of headphones that delivers great 2.1 audio for gaming and music without swamping you with bass.</p>	POWER SUPPLY	 <p>COOLER MASTER G750M PRICE \$125 Outstanding value for money, it's powerful enough for even performance PCs packing twin GPUs. NEW</p>

TOTAL: \$5441 RIG ONLY: \$4338

COOLER	 <p>CORSAIR H105 WATER COOLER PRICE \$160 Best-of-breed cooling plus nice and quiet equals a happy CPU.</p>	CASE	 <p>COOLER MASTER COSMOS II PRICE \$400 The only case you'll ever need. Premium luxurious bliss.</p>
SYSTEMDRIVES	 <p>SAMSUNG 840 EVO 1TB SSD PRICE \$680 Samsung has conquered the market with its 840 EVO, so fill up with 1TB of incredible speed and storage.</p>	KEYBOARD	 <p>CORSAIR VENGEANCE K95 PRICE \$179 The perfect keyboard. Lovely Cherry Red mechanical switches, a slick and attractive aluminium body and customisable backlighting make this The One.</p>
DISPLAY	 <p>ASUS PB287Q PRICE \$799 A fully-featured 4K monitor with near-perfect colour accuracy for under \$800.</p>	MOUSE	 <p>RAZER OUROBORUS PRICE \$125 An excellent performer and highly configurable mouse that suits both left- and right-handers.</p>
AUDIO	 <p>ASUS XONAR ESSENCE ST/X PRICE \$175 The go-to card for perfect music quality, though the motherboard's onboard sound is fine if this isn't so important to you.</p>	POWER SUPPLY	 <p>CORSAIR HX1000I PRICE \$349 Corsair's mighty HX1000i pumps out extremely reliable power, even when under full loads. NEW</p>

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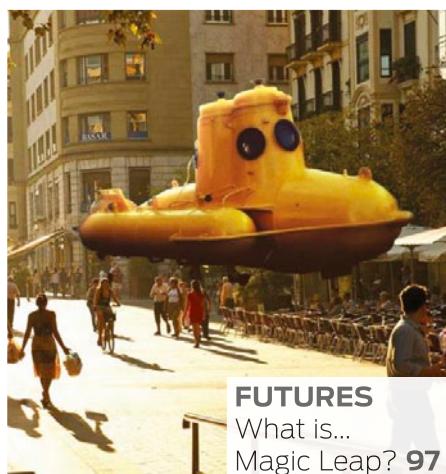
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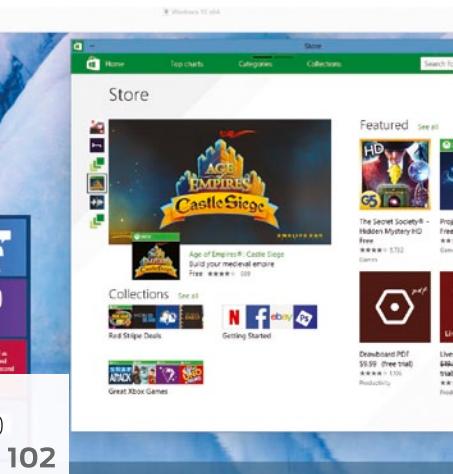
THE BACK SECTION...

Each month our experts get under the hood to provide you with detailed How To guides on hardware, software and everything in-between. Our team has been writing about technology for decades, and most run their own IT business. This A-Team is here to share their wisdom, experiences, and sometime, unfettered disappointment when things aren't as good as they should be.

HOW TO
Build a business website for next to nothing **93**



FUTURES
How wearable devices could save your life **84**





HOW WEARABLE DEVICES COULD SAVE YOUR LIFE

Pioneering research projects are developing wearables that offer an accurate and non-invasive way to treat disease, says **Jane McCallion**

Smartwatches can track your steps and monitor your runs, but there's more to wearables and health than simply fitness. Wearable devices are also being used to monitor and treat medical conditions in more accurate and less invasive ways than have traditionally been available. And, if predictions bear out, they could eventually lead to treatments for currently incurable diseases.

LOOKING FOR A CURE

One example of how wearables are being used to monitor and treat disease is a partnership between Intel and The Michael J Fox Foundation (MJFF), where data is gathered to track the progression of Parkinson's disease and assess how well a patient is responding to medication.

Patients involved in the project are given off-the-shelf smartwatches, and the accelerometers are used to monitor gait and tremors. The data, which can capture hundreds of readings a second, is sent back to the patient's smartphone, which in turn relays it to an Intel-developed Big Data analytics platform.

"Our hope is that the use of these technologies can help develop a therapy to slow or stop Parkinson's progression," Todd Sherer, CEO of the MJFF, told us.

Currently, patients are expected to track their disease by keeping a diary of their symptoms. However, this is time-consuming, and the self-reported data is often subjective.

Vin Sharma, Big Data analytics strategist at Intel, added: "The ability to collect data from sensors could dramatically enhance our understanding of Parkinson's disease by enabling scientists and physicians to gather data continuously and unobtrusively, with little burden on patients themselves."

While Parkinson's disease is one of the best-known illnesses that impairs patients' motor control, other projects are underway to assess and monitor rarer diseases. Elin Haf Davies is a specialist in the use of wearable technologies to measure gait in patients suffering from ataxia, which affects balance and co-ordination. She's currently working with Great Ormond Street Hospital and Niemann-Pick UK on a project called



Google's contact lens could remove the need for painful blood draws

"aparito" that uses wearables to chart patients' symptoms.

Currently, patients are assessed with a pair of six-minute walking tests, to establish the severity of their symptoms and the disease's progression, as well as how they are responding to any treatment. The test has become "the gold standard" in clinical trials for ataxia drugs, where it is used once at the beginning of the trial and once at the end, said Davies.

"I want to try to use wearable technology so we have a continuous idea of how the patient is doing while they're in a 12-month clinical trial, [rather than] just relying on 12 minutes' worth of data," she said. Currently, the team is focusing on tracking gait using off-the-

shelf smartbands containing accelerometers. Using these devices, the team is able to constantly monitor a child's gait for the duration of the trial. As the project continues, sensors to measure other ataxia symptoms will be introduced.

As well as use in clinical trials, Davies says wearable technology can provide a better experience for paediatric patients in general, as having a smartband on their leg or wrist is easier for children than the tests they currently undergo. "Finding an age-appropriate and disease-specific test in the paediatric population is incredibly challenging, especially as a lot of the tests are lengthy, invasive or painful. For example, trying to keep the attention of a five-year-old for six minutes and keep

them walking is incredibly difficult," she said. "This smartband is non-invasive, and you don't have to subject the child to quite so many hospital visits."

NEEDLE-LESS BLOOD TESTS

The use of wearables can go beyond monitoring the external symptoms of diseases, and researchers are using smart devices to reduce the pain associated with blood tests or drug administration –

"The ability to collect data from sensors could dramatically enhance understanding of Parkinson's disease"

in other words, to cut the use of needles.

Of these, one of the best known is Google's smart contact lens, which can monitor the blood-glucose levels of diabetics. Currently, most diabetic people monitor their blood sugar levels through "lancing" – using a needle to draw blood so it can be applied to blood-glucose strips and monitors, which can be painful. The Google smart lens looks like a standard contact lens, but it's embedded with a wireless chip and miniaturised glucose sensor. A tiny hole in the lens lets tears seep through, allowing the sensors to measure glucose levels in the fluid and send the information back to the user's smartphone.

▼ The "aparito" app lets parents record extra data about their child's condition



HEALTH ON YOUR PHONE

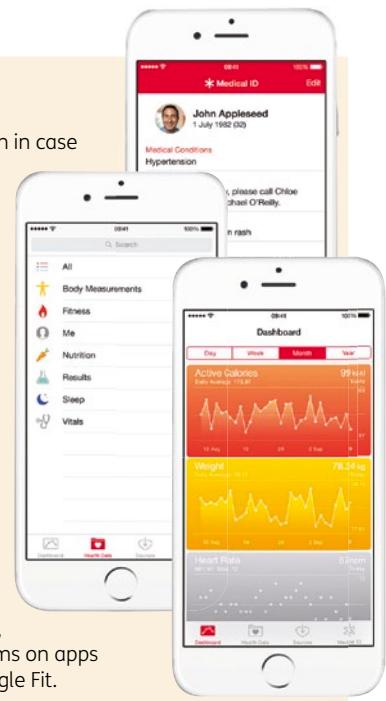
Consumer wearables are taking a step beyond tracking runs: both Android and iOS boast new health-management systems.

Apple's HealthKit gives developers the ability to access data collected by sensors in your iPhone or the soon-to-arrive Apple Watch, and to share information with other apps – so your run tracker could monitor your weight or blood pressure, too. The data includes heart rate, calories burned, blood-sugar levels and more, and it's all stored in the iOS Health dashboard.

Aside from tracking how well your fitness plan is working, you can also set up a medical card with information on prescriptions, allergies and medical conditions that can be accessed

from your lockscreen in case of emergency.

Android, meanwhile, has Google Fit. This allows developers to access health-and-fitness data, although it's not being released until later this year. Like HealthKit, Google Fit will capture sensor data from your devices, and keep it in a central hub, exposing it to apps via an API. Google says it's working with Nike, Runtastic, and other sports firms on apps and devices for Google Fit.



Commercial development of the device has been licensed to Alcon, the eyecare division of pharmaceutical giant Novartis. It told us that when the device is made available commercially in a few years' time, it will help diabetic people manage their disease in a "minimally invasive" way.

Rather than popping round to your GP for a blood test, researchers at the University of Southampton are working on another device that lets you monitor key health measures all the time, with little physical effort.

Dr Xize Niu, who is leading the project, said: "When people talk about wearable healthcare devices at the moment, they think about monitoring the user's heart rate, blood pressure, and all these kinds of physical things. What we're developing

▼ Wearables could analyse blood chemicals without the need to send samples to a lab



is a wearable [device] that can continuously monitor the chemicals in people's bodies."

The device is about half the size of a smartphone and samples one nanolitre of body fluid at a time through a micro-dialysis probe – a small needle no more than between 0.2 and 0.5mm in diameter. The fluid is then analysed by what Niu described as "a lab on a chip" embedded in the device.

"The analysis can look for one or more biomolecules or drug concentration in the fluids, such as blood sugar, lactate (the base of lactic acid) and other biological markers clinicians are interested in," he said. This has the potential to prevent the need for painful blood draws, as well as providing medical personnel with a more accurate idea of what's going on in a patient's body, as the method produces significantly more data points than can normally be achieved.

The device currently uses a standard microdialysis probe, but since it can work at the nanolitre rather than microlitre level, it will ultimately support much smaller probes.

"If the probe can be less than 70 micrometres (0.07mm) in diameter, it will not cause any sensation or pain during the sampling," said Niu.

The device has been patented but is still in the prototyping phase, so it's not expected to be in use for a couple of years yet – although anything that takes the sting out of needles, and other medical procedures, is a wearable worth waiting for.



it's time to bring magic back
into the world.™

technology can be awesome



WHAT IS... MAGIC LEAP?

Google has led a US\$542 million funding round into start-up Magic Leap, which promises to bring "magic" back to the tech world through "cinematic reality"

Most of us know that a world with dragons and unicorns, elves and fairies is just a better world. What would happen if we used technology to bring magic back into the world?" That's the intriguing question secretive start-up Magic Leap poses on its website, although the site itself offers few answers. Now the company has added more than US\$500 million in investment from the likes of Google to its cash hoard, and Android chief Sundar Pichai to its board, a few details are emerging.

WHAT EXACTLY IS MAGIC LEAP MAKING?

Magic Leap describes its human-computing interface software as "cinematic reality", saying it uses a new "biomimetic" technology – meaning it mimics natural systems – called a "digital lightfield". It appears to blend real life with virtual and augmented reality, overlaying a lifelike 3D model of an item into the real world.

WHAT DOES THAT MEAN IN NORMAL LANGUAGE?

Magic Leap will show realistic virtual images overlaid on – and interacting with – the world around you. The examples on the website suggest you can pop on some smart glasses and it will look as if there's a whale flying through the space in front of

you, or an elephant curled up in your hand. The company has yet to offer any public demos, but all the private ones have left investors chucking money at it.

SO MAGIC LEAP IS MAKING CLEVER VIRTUAL REALITY (VR) SOFTWARE?

Magic Leap isn't only developing the software, but is also building wearable devices to go with it – similar to what Oculus Rift has done with its VR system. Reports suggest it's working on lightweight glasses rather than a full headset, which could be one reason Google is interested: it has already launched its own smart glasses. CEO and founder Rony Abovitz has experience with hardware: he previously started MAKO Surgical, which made robots that interact with humans for surgery. He sold the firm in 2013 for US\$1.65 billion.

WHAT WILL IT BE USED FOR?

With the word "cinematic" being tossed around, it seems Magic Leap has entertainment in mind, and it was kick-started with help from Weta Workshop, the special effects studio that helped make the Lord of the Rings series. A key hire earlier this year suggests games are also in the works: Graeme Devine, a well-known games designer who has previously worked for Lucasfilm, Apple and Microsoft's



Ensemble Studios, was hired in March to set up a development studio.

However, the company is also pushing its technology as a way to interact with your computer, possibly giving you a full display via smart glasses or even projected on to your retina. Abovitz told The Wall Street Journal that the interface could replace PC monitors and smartphone screens. Not only could you play intriguing games and interact with a computer without staring at a display, but you could also talk to a person miles away as if they were in the same room.

WHEN CAN WE EXPECT A LAUNCH?

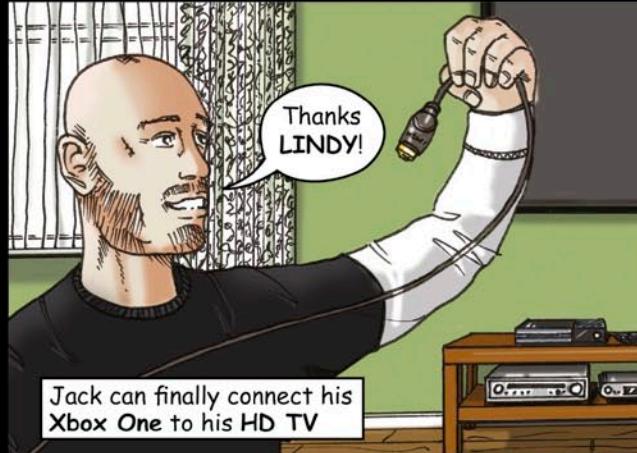
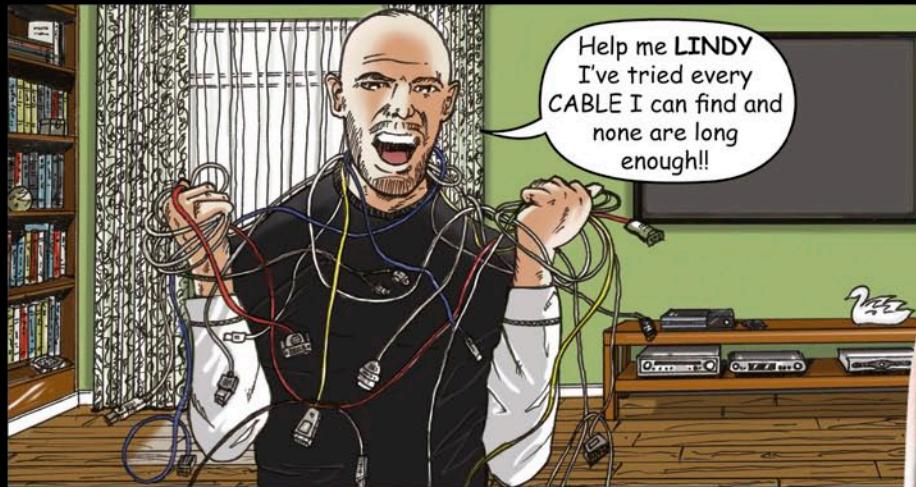
All Abovitz has said is we can expect a consumer launch "relatively soon". Keep your virtual eyes peeled, as this new twist on augmented reality takes form.

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PC TROUBLESHOOTING

Last month, **David Hollingworth** had some simple tips for budding PC builders. Now, let's look at what happens when you power on but nothing happens...

There's an amazing feeling of pride from building your own PC. You've chosen the perfect parts, ones that mix the best power you can get with your budget, and aimed at no one else's idea of what you need. You've carefully installed them all, you've wired your system together, screwed in the last screw, and hit the power button for a quick test, and...

Nothing

Nada.

Zip.

There's nothing that's going to make you feel quite so small. But do not despair! This actually happens to the best of us, and while it may seem daunting finding out what's gone wrong, and how you can fix it, is just a matter of being thorough.

First things, do check it isn't something obvious. Check your power cables, and make sure your PSU doesn't have its own power switch – if it does, make sure it's switched on. If all of that's fine, it's time to start working down the line. Check the wall socket – you never know – and any powerboard you might be using. Then check the voltage switch on your PSU, and make sure it matches local voltage. If all this works,

switch out the power cable you're using, in case that's the culprit – if you're at all like a lot of us in the office, you'll have a lot of these, and they can fail in time.

At this point, if everything outside the case is working, it's time to dive back in.

This may sound odd, but give the inside of your case a good sniff. If you're smell anything burnt or like ozone, or if you can hear a high-pitched whine from the PSU, guess what – it's your PSU. It's much rarer than it used to be, PSUs tend to have two points of failure – and they're at the end of their life (obviously), and when first turned on in your shiny new PC. If this is

the case with your build, test a spare PSU; you'll likely have the one from your old PC, and it'll do fine for testing.

If it works, return your faulty unit and get a new one. You

should be fine at this point, and get about installing your operating system.

If all seems fine with your PSU, the next most likely culprit are the headers for the power switch on the front of the case. These simple cables are usually nested in amongst audio and LED cables, as well



▲ Poor airflow can cause your system to slowly overheat and shut down.

the reset button, and are quite easy to install in the wrong spot. Double check the wire placement with the diagram in your motherboard's manual.

These are the most common problems with a newly built PC, and every time we've had a system fail to power up, it's been one of these things. That said, if everything is in order, see if your motherboard has its own power button (many overclocking models will), and try that. If that works, it's likely the case's power switch that is the fail point. You can either contact the manufacturer for a replacement, or, again, return the unit and get a new one.

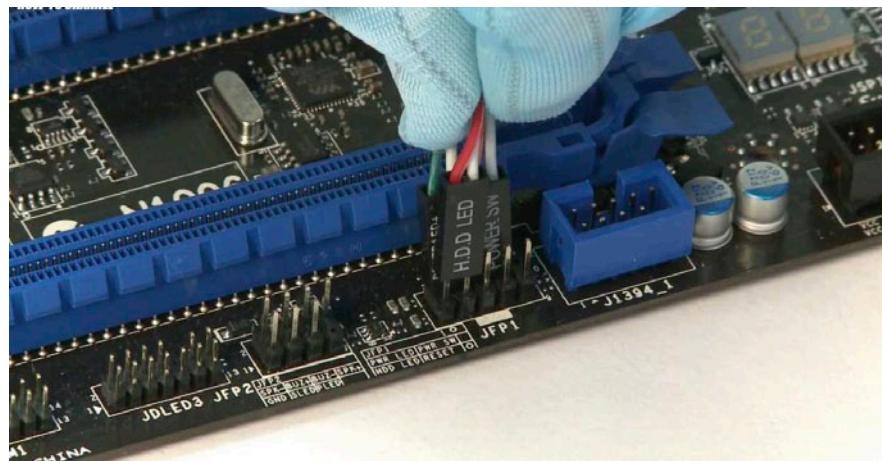
If you're still living in the Land of No PC, well... now things get really tedious. At this stage, it's likely going to be a component issue. Change out the CMOS battery, and if that still doesn't do the trick, then it's time to get drastic and consider the possibility that your motherboard is hors de combat. Essentially, even testing this theory means basically rebuilding your system.

We're sorry.

AT LEAST IT STARTS...

It also entirely possible that your machine

◀ One of the fiddlier parts of any PC build - getting the IO headers right!



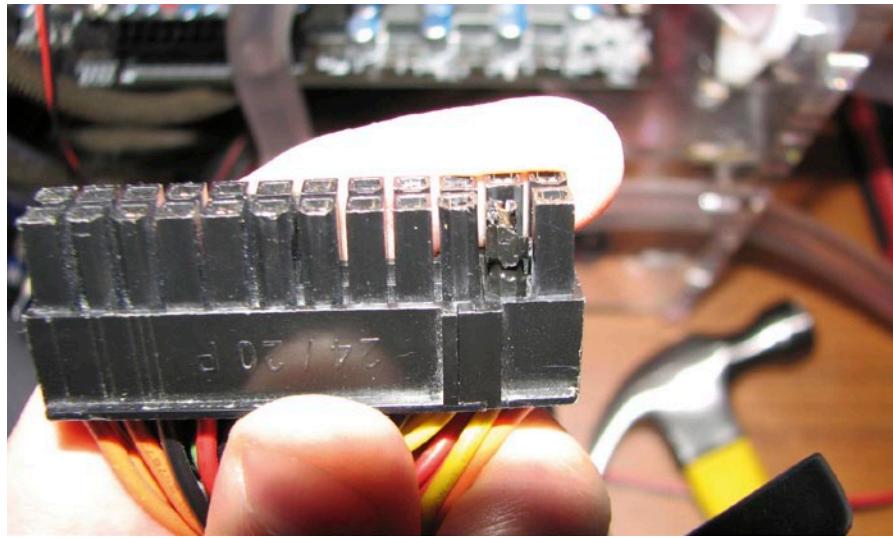
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When motherboards and power supplies go bad.

"Unless, of course, it's our old nemesis heat, or a faulty PSU that's slowly failing."

is starting, but still failing to complete the boot process properly. If you're getting power – fans turn on, drives start to whine, and so on – but the machine then shuts down, it's likely a fault of some kind that can be found by following the above process of checking cables and internals. In this instance, though, checking the CPU is properly seated is probably a good idea.

Your machine could also get stuck in a cycle of powering up, shutting down, then powering up again, basically looping on and off. Nine times of then this means you've either got a faulty motherboard, or your PSU is either faulty, or possibly not powerful enough.

There are a lot of possible errors to list, and our space is limited, but in all our experience, we've found we're never alone when it comes to odd startup errors. The internet, however, is your friend.

ALL OPERATING SYSTEMS ARE... NOT GO

So, your machine is powering on, you've gone through the Windows install process (and had a cup of coffee while waiting), and you think you're all good to go...

And bam.

If your machine powers on, and stays on (woohoo!), but shows an error message before booting into the OS, and stops there, take note of the error.

Common errors include 'BOOTMGR is missing' or 'NTLDR is missing'; in fact, it's usually a missing file or driver of some kind that is the culprit. As we said, take note of the exact message, and try searching for it on Google (on a working device, of course) – you'll more than likely find exactly how to go about dealing with the problem, from messing about with boot orders in the BIOS to running a Startup Repair of Windows.

It's also possible that you're new machine works well for a while, but then either blue-screens or shuts down entirely. Depending on your Windows OS (yes, we're talking Windows, because talking about multiple OSes could fill a LOT of pages), you should access MSconfig or System Configuration. Select the Diagnostic Startup option, reboot, and see how things go. If all is well, start re-enabling applications. It's a little tedious, but it should find what's causing the issue.

Unless, of course, it's our old nemesis heat, or a faulty PSU that's slowly failing. The latter is unlikely, so see if your motherboard comes with any tools for monitoring CPU and system heat. It's entirely possible that if your new build is not adequately cooled, that slow heat build-up is causing the issues. If your CPU is getting toasty, think about installing some extra fans, or double check the airflow in case cables are getting in the way.

Troubleshooting can be tiring, but hopefully, after all this, you'll have a smoothly running system. And speaking of tiring, I think even I need a nap. ●

THE BEEP CODE

It's rarer these days than it used to be, but the beep code can still be handy. Once upon a time, PC cases came with small speaker designed to help transmit motherboard errors, but these days if a motherboard is going to rely upon beepcodes, there's a small speaker on board.

Annoyingly, beep codes vary depending upon the BIOS your motherboard is using. So if you're having startup issues, and there's an odd beeping coming from the guts of your system, take note, and check out this page: <http://www.computerhope.com/beep.htm>

And so you have an idea what to listen for, here's a list of AMIBIOS codes:

BEEP CODE	DESCRIPTIONS
1 short	DRAM refresh failure
2 short	Parity circuit failure
3 short	Base 64K RAM failure
4 short	System timer failure
5 short	Process failure
6 short	Keyboard controller
7 short	Gate A20 error
8 short	Virtual mode exception error
9 short	Display memory Read/Write test failure
10 short	ROM BIOS checksum failure
11 short	CMOS shutdown Read/Write error
1 long, 3 short	Cache Memory error
1 long, 8 short	Conventional/Extended memory failure
two-tone siren	Display/Retrace test failed
	Low CPU Fan speed, Voltage Level issue



14cm fan for better cooling



PSU status monitor



Cable management



What the critics say:

The Thermaltake Toughpower XT 875W offers a great combination of features, aesthetics, quality, versatility, and performance. If you're a person that appreciates quality design and construction, then the Toughpower XT 875W will not disappoint you.

– Pure Overclock



GO PRO WITH YOUR OWN EMAIL ADDRESS

If you run a small business or want to develop your personal brand, dump Gmail and set up a professional domain, says **Nik Rawlinson**

It's time to face facts: the only people who look professional with a Gmail address are those who work at Google. If you don't believe us, think back to the last time you were stuck behind a plumber's van in slow-moving traffic. It was almost certainly plastered with mobile numbers, and probably a webmail address. How much more professional would it look if they had their own domain?

Registering a domain is cheap – typically \$20 or less – and setting it up to handle your email is easy. You'll be up and running in under an hour and, if you're that plumber, we're fairly sure it will bring you more business, too.

REGISTERING YOUR DOMAIN

Unless you've already registered your perfect domain (in which case jump ahead to Setting up your email, opposite), this is the tricky part. If you were counting on bagging, say, plumber.com, don't start repainting the van just yet. That domain was registered in 1995 and won't expire for another two years. Even then, the existing owner has first dibs on renewal – as is the case with all domains – so it's highly unlikely to come your way.

A new domain is snapped up every 20 seconds. At the end of last year, VeriSign put the total number of addresses recorded in the previous three months at 271 million – that's 2.9 million domains per day. It's no wonder that the name you're after, unless it's your own and you happen to have an unusual moniker, has probably gone. If you want a chance of registering something memorable, you'll have to think

✓ Some of the best domains were registered years ago – plumber.com back in 1995, for example

Registrar Info	
Name	NETWORK SOLUTIONS, LLC
Website Server	whois.networksolutions.com
Referral URL	http://networksolutions.com
Status	clientTransferProhibited

Site Status	
IP Address	174.143.199.227
Status	active
Server Type	Apache-Coyote/1.1

Traffic Info	
Expires on	January 02, 2016
Registered On	January 03, 1995

smart – either by combining relevant words or looking beyond the most familiar top-level domains for your new home on the net.

TOP-LEVEL DOMAINS

These sit at the end of each domain. It's the .com, .au or .net suffix with which we're all familiar. Some top-level domains (TLDs) are more popular than others; with .com streaking ahead, and .uk being the world's third most popular country-specific code. Every common profession in either of these TLDs is already taken, and even if you combine your name with your job, there's no guarantee you'll strike gold (timtheplumber.com was registered a

"A new domain is snapped up every 20 seconds. It's no wonder that the name you're after has probably gone"

decade ago).

Luckily, new TLDs such as .club and .city give local businesses a second chance, but they each have rules attached – including a restriction on certain words.

MOVING INTO SECOND

If your chosen domain isn't available in the .co.au, .com or relevant geographic TLD of your choice, you need to widen your search. Consider a generic option, such as .company, .cloud and .dot, and use mainstream registration services to search multiple TLDs simultaneously and draw up comprehensive lists of available options for any keyword.

COMBINING WORDS

Alternatively, look for a sensible, relevant combination. Sticking together two or three descriptive terms, such as "leaks", "be" and "gone" gives you a better chance of success (case in point: leaksbegone.com is available at the time of writing, and so is leeksbegone.com if you want to catch potential customers who can't spell).

It's quirky and descriptive, and it's also highly memorable. Put tim@leaksbegone.com on the back of your van and it will stick



in the minds of delayed drivers far more effectively than a long string of letters and digits hosted at Hotmail or Gmail.

Tools such as Bust A Name (bustaname.com) simplify the task of finding working combinations, allowing you to type in a list of keywords that it will mix and match until it finds an available hit. Note, though, that it only covers the likes of .com, .org and .net.

SETTING UP YOUR EMAIL

A few hours after registering your domain, it will start showing up in domain name system (DNS) databases around the world. These are used to correctly route your email to the server on which the domain is hosted. All you need to do is set up an email-hosting account to process the messages once they arrive.

The process for doing this differs between providers. Some, such as One (one.com), offer a free email account with any domain you register through it; others charge per address.

There's always a limit to what you get bundled with a simple domain name registration. This is hardly surprising, because web hosts want you to take advantage of their services rather than simply sit on domain names. If all you want to do is forward email and reply to it, then that should be possible for free, provided you jump through the hoops outlined (see Email forwarding, p92, for a run-through of how to do this). Using your web host's webmail service, on the other hand, is likely to be an extra cost.

All web hosts require you to log in to your domain control panel and specify the email address you want to use from there. At the very least you'll need to provide a mailbox name – which goes before the @ – and a password to keep it secure. Some will also ask for a real name that can be appended to outgoing emails when using an associated webmail service.

If you choose to use your web host's webmail service as part of a hosting package, this will be set up automatically,

"You could have one mailbox for complaints, another for bookings and a third for personal mail, all on the same domain"

- Dedicated email hosting services such as Zoho Mail are often great value (or free)

and your host should detail within its configuration pages the address at which you can find the webmail interface. If not, put in a support request, and in the interim try adding "mail.", "webmail." or "atmail." to the front of your domain name, without the www.

If you prefer to use a regular client rather than webmail, most email-hosting services offer a choice of POP3 and IMAP connections. POP3 (Post Office Protocol 3) is the most basic offering: incoming messages received by the server are mirrored on your computer, smartphone and tablet – but any you mark as read on one device will still appear as unread on the others. It doesn't archive outgoing messages on the server, either – so if you settle for POP3, you'll need to additionally specify an SMTP (Simple Mail Transport Protocol) server address within your email application to handle outgoing mail.

IMAP (Internet Message Access Protocol) is a better option, since it updates the read status on the server and any connected devices when it's changed on just one of them, and archives outgoing messages on the server.

Fortunately, almost all email servers identify themselves automatically, so supplying your email address and password is usually all that the email client needs to configure itself. If not, all hosts detail their server addresses in their support pages, and will usually include it in the welcome email you'll receive when setting up your account.

When setting up your client, pay attention to the server ports and authentication options, which may differ from the default options offered up by your software. Setting these incorrectly is a common failure point.

The screenshot shows the Zoho Mail homepage. At the top, there's a navigation bar with links for Home, Features, Pricing, FAQ, Help, Contact Us, and Sign In. Below the navigation, a large banner with the headline "Take Control Of Your Inbox" features a row of colorful post boxes. Below the post boxes, the text "Your Inbox Is Not A Billboard" and "Don't pay for free email with your privacy. Get top class email hosting FREE for up to 25 users. 100% AD-FREE!" is displayed. A red "GET STARTED" button is prominent. The bottom of the page shows a snippet of the inbox with several emails listed.

EMAIL-ONLY ACCOUNTS

Many registration companies bundle together email accounts with web-hosting deals, which is overkill if all you want is a more memorable address to paint on a van. In this case, specialist email-only options can be a better choice.

Simply Mail Solutions (simplymailsolutions.com), for example, offers email-only hosting on Microsoft Exchange servers from US\$2 per month. It's a small price to pay if email is key to your business, and it's a neat solution for solo users, too.

If you're setting up an email-only domain for a small business, then take a look at Zoho Mail (zoho.com/mail), which lets you host up to ten users on a single domain for free. Those users don't have to be real people, so you could have one mailbox for complaints, another for bookings and a third for personal mail, all on the same domain.

REDIRECTING YOUR MAIL

Registering a domain automatically points all of its services – email, web and FTP – to the servers of the company through which you reserved it. So, if you want to use a third-party service, such as Zoho or Simply Mail Solutions, you'll need to redirect the incoming email to their external servers.

To do this, log in to your domain control panel and look for an option to change your DNS settings and, within this section, check any specific mention of mail exchange (MX) records.

These specify the address of the primary and backup servers handling incoming email. (If you can't find these details, check through your host's FAQ or contact its support team.)

Make a note of the default entries so you can change them back if required, then replace them with those of your third-

party service. If you're using Zoho Mail, for example, you'd enter:

Host	Address	Priority
@	mx.zohomail.com.	10
@	mx2.zohomail.com.	20

(Note the full stop at the end of each address: this is important and must be included.)

It can take a few hours for these changes to propagate round the net, but once they have done, incoming mail will bypass your registration company's servers and arrive in your third-party account.

EMAIL FORWARDING

Most registration providers offer email forwarding as a free add-on to a registered domain, using it to bounce the email they receive on your behalf to an existing account hosted elsewhere.

Some only offer "catch-all" forwarding, in which every incoming message is passed on, including your spam. Spammers frequently target generic mailboxes such as admin@, user@ and root@ at your domain, so finding a host that allows you to forward specific mailboxes, such as bookings@, jobs@ and tim@, and discard everything else, is an effective first level in spam defence.

Most domain control panels give access to this feature through a link labelled "email forwarding", but some may rename it "email redirect" or even "domain redirect". When you've identified it within your provider's dashboard, supply the address to which you'd like to forward your messages and specify which mailboxes you want to receive (hello@leaksbegone.com, for example). ●



WALKTHROUGH

Spoofing your From address

We describe below how to have emails forwarded to your personal account. Any replies you send to those messages will emanate from your existing email account, however, and show your address at that service rather than your bespoke domain. So, if you're forwarding them via a webmail service, you should change the From address in your account settings.

▲ If you don't already have a Yahoo Mail account, set one up at mail.yahoo.com, then use the email-forwarding option in your domain control panel to forward all incoming email received at your domain to the new Yahoo address.

▲ Log in to your Yahoo inbox, click the cog in the top-right corner and pick Settings from the menu. Click Accounts in the sidebar of the pop-up dialog, followed by the Add button beside Accounts in the main body of the box.

▲ Enter the address you're forwarding (such as tim@leaksbegone.com) in both the Email Address and Reply To Address boxes. Click Save, and a confirmation email will be sent to your new domain – from where it will be automatically forwarded to your Yahoo inbox.

▲ Click the link in the email to let Yahoo send outgoing messages using your domain address. Then, click the cog again and select Settings. Click Accounts and select & your domain address from the menu beside Default Sending Account.

▲ Now, whenever you send a new email or reply to a forwarded email through the Yahoo webmail interface, your domain address will be automatically specified in the From field, giving your outgoing emails a more professional appearance.

BUILD A BUSINESS WEBSITE FOR NEXT TO NOTHING

A professional-quality website needn't cost the earth. **Kevin Partner** explores how you can set up an online presence for your company quickly, simply and with minimum cash

It's true what they say: there's no such thing as a free lunch. If you want a professional website worthy of your company, you'll have to pay for hosting (at least). This needn't be expensive, though – and when it comes to building the actual pages you can use fully featured, free software to create a high-quality site.

Open-source content-management system (CMS) WordPress is the best choice for creating most business websites. It's free, easy to use and well supported, with many internet hosts offering wizard-style scripts that make installation a one-click process. Although originally conceived as a blogging platform, WordPress is now widely used on professional websites, and there are thousands of high-quality designs that can be applied to suit your business, many of them free.

SETTING UP WEB HOSTING

If you're setting up a site for a new business, do yourself a big favour by choosing the right hosting package at the outset. The ideal package will allow you to use your own domain, offer WordPress installation and feature reliable, ongoing hosting for a low price. As an example, we've chosen 1&1's WP Basic package (www.land1.com/

wordpress-blog-hosting#top). Its basic WordPress hosting package costs US\$5.99 per month. Of course, there are also plenty of other providers to choose from, including award-winner Heart Internet. Although the specifics of setting up the hosting will vary, the rest of the process is much the same once WordPress is installed.

Another important part of the process is registering your domain, since this will be crucial to your identity and branding. This needn't be expensive, either, with the most common domains – .co.au, .com – ranging from about \$2 to \$20 per year. It normally makes sense to register your domain with the firm that's hosting your site, even though you could probably save a few dollars by choosing two separate companies. Keeping one point of contact makes configuring your internet space simpler, and ensures any support issues won't fall through the cracks.

That said, it's worth double-checking the terms: 1&1's WP Basic package comes with free domain registration, but it's tied to the package – if you cancel your hosting, you lose the domain. It's much better to register your URL separately: you can still do this through 1&1, or by transferring an existing domain to your 1&1 account. This way, you

can simply switch to a different package, or host, if the WP Basic package doesn't work out for you.

Registering a new domain via 1&1 is as simple as going to www.land1.com/ **domain-names**, typing in your preferred address and clicking Check. If your choice is available, click the trolley icon to add it to your shopping cart. During the buying process, 1&1 will entice you with offers of hosting and other add-ons – just ignore these... or not.

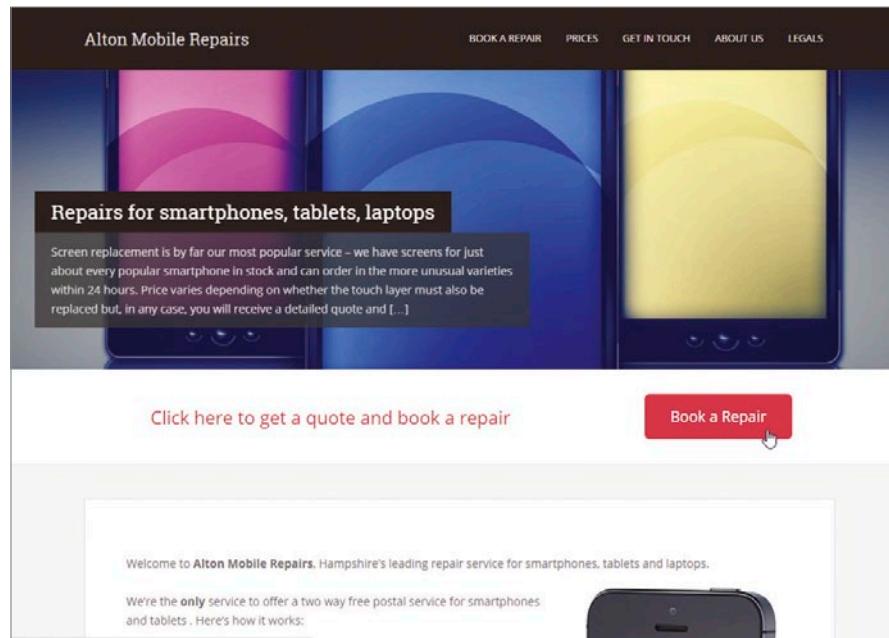
"Register your domain with the firm that's hosting your site; keeping one point of contact makes it simpler"

Next, you'll receive an email with the subject line "Contract Confirmation", which contains your customer ID at the bottom. Use this to log in at land1.com/login and check your Instant Domain Registration package is in place. Bear in mind that the domain will take 24 hours or so to propagate across the web, so it's best to set up the hosting the following day.

When you're ready, head to land1.com/ **wordpress-blogs** and follow the order process for the Basic package. When prompted, indicate you're an existing customer and that you don't want to buy a domain as part of the setup process. Again, you'll receive a contract confirmation email: when you log in to your 1&1 control panel, you should see the WP Basic package listed alongside the domain.

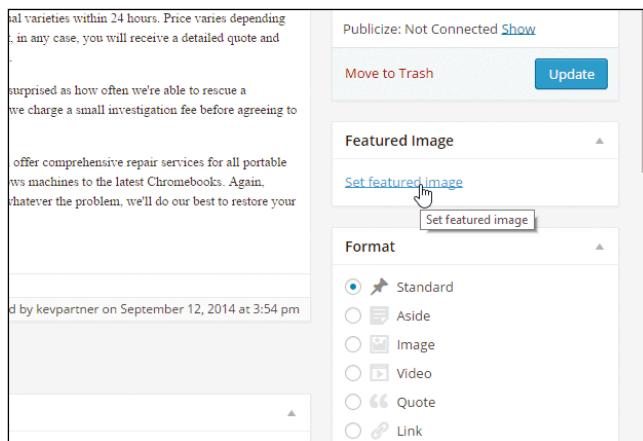
The last thing to do is assign your domain to the WP Basic package. To do this, click on your Instant Domain Registration package, then click Domain Centre. From the Transfer/Move Domain dropdown list, choose "Move additional domain between packages". Select your domain in step 1, then the WP Basic package from step 2; confirm in step 3 before clicking Move Domain. You'll now need to leave an hour

< With a tiny investment of cash and time, it's easy to create a professional website without any technical or design expertise

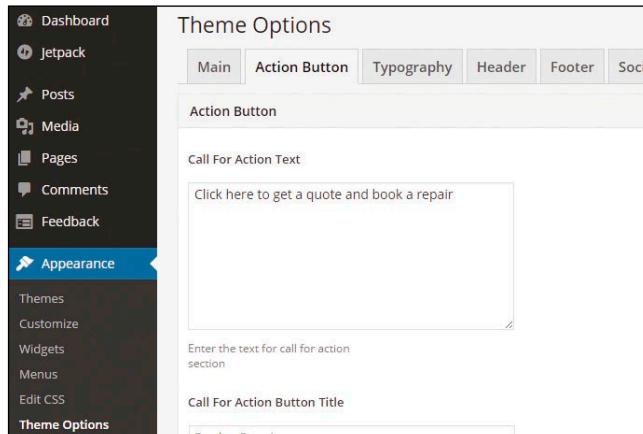




WALKTHROUGH Installing a carousel and polishing up your site



▲ Click Posts | Categories and create a category called Slider. Then go to Posts | Add New and create a post about your core product, assigning it to your category. Look for the Featured Image panel on the right, click the link and upload an image. Create images for next to nothing at canva.com – choose the Twitter cover template.



▲ Staying in Theme Options, click the Action Button tab. Here, add a “call to action” message, and an accompanying button. Click Typography to change the fonts used on the site, and use Header and Footer to change both their contents and colours. Finally, click the Social tab to add links to your various social networks.

or so for the package transfer to take place before setting up WP Basic.

INSTALLING WORDPRESS

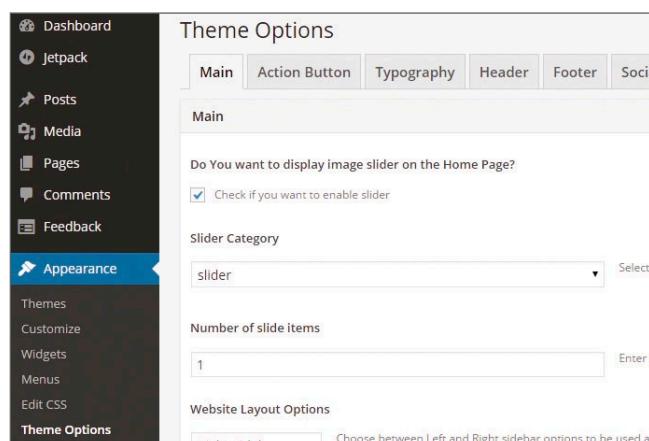
If you already have hosting, WordPress may already be installed – or may be available for one-click installation from your hosting provider. If not, it’s a good idea to make contact and see if there’s an easy way to get hold of the software: it’s perfectly possible to perform a manual installation yourself (instructions are available at http://codex.wordpress.org/Installing_WordPress) – but you’ll need shell access to run the necessary commands.

If you’re using a I&I WP Basic account then you can simply visit the online control panel and click the “set up WordPress button” at the top (if this doesn’t appear,

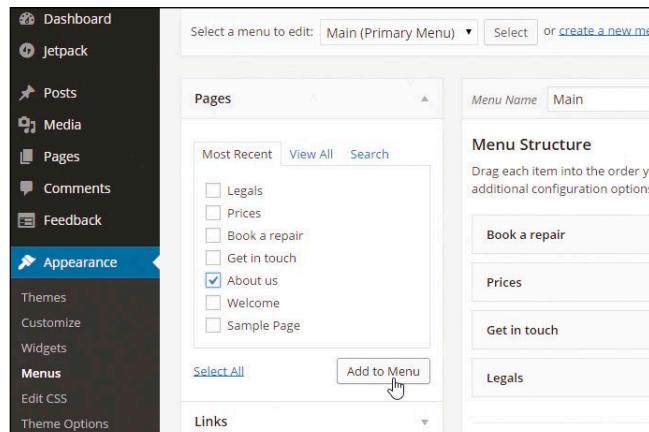
scroll down and you’ll find WordPress under 1&I App Centre), then click Install. You will now be prompted to give your website a title – this will usually be the name of your business. Click Create Website.

Choose a memorable but unpredictable username (not “admin” or anything similarly obvious) along with a secure password and, under Type Of Installation, select Free Mode. Although Safe Mode may seem the better choice, the latest version of WordPress updates itself, so the benefits are marginal; Free Mode gives you access to a larger selection of themes and plugins.

Click Continue and I&I will ask you to choose which domain you want to assign to the WordPress install. This is where you select your independently registered URL and click Assign Domain. WordPress will



▲ Click Appearance | Theme Options and tick Enable Slider. Choose your category from the dropdown and set the number of slide items to 1 – you can add extra posts later. On this page, change the element colour to one that suits your photo; this will be the colour used behind the slider heading. Click Save Options and review your site.



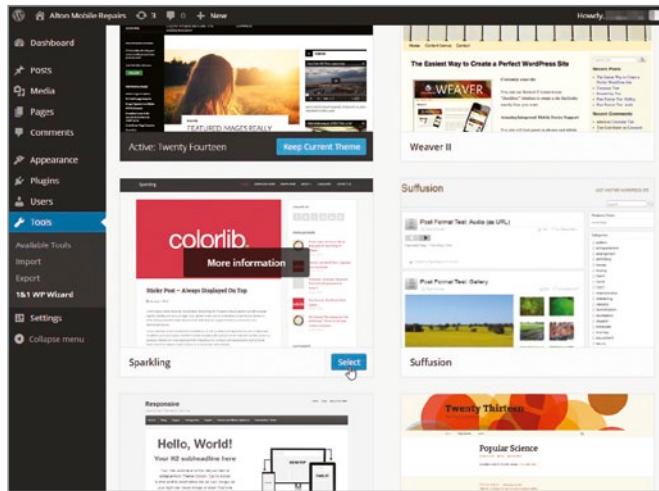
▲ To create a navigational menu, go to Appearance | Menus and give the menu a name (you can have multiple menus per site). You’ll see the site pages listed on the left: select those you wish to add to the menu and click the button. You can drag and drop to reorder them or move them sideways to have them appear as a submenu. Save the menu.

now be installed, and you can test that it has worked by typing your URL into a browser. Don’t worry – the plain-looking web page you’re looking at is the default WordPress design that we’ll be modifying before we launch.

THEME IT

Broadly speaking, the way you add functionality and visuals to a WordPress site is by choosing themes and installing plugins. I&I’s WP Basic package includes a wizard that takes you to the WordPress Dashboard and helps you begin the setup process. If you’ve used a different provider, you can access these options from the Appearance and Plugins menus.

The first thing we suggest you do is click the Get Started button and choose



Business Website from the list of site types. This filters the themes you'll see at the next step, so you won't be swamped by inappropriate designs; for this example, we picked the Sparkling theme from Colorlib, but one of the great strengths of WordPress is that you can try out as many designs as you like without affecting any other aspect of the site. Whichever you pick, make sure it's responsive (**see Think mobile, below right**) – this will always be in the description of the theme. Click the Select button to install Sparkling.

The wizard now invites you to add a selection of useful plugins: we recommend you choose WordPress SEO, Google XML Sitemaps, Site Manager, Simple Page Ordering and Akismet from this page. We don't have space to describe these plugins in full, but a quick web search will provide details on how they can help make your site easier to find, manage and keep relatively free of spam.

We also recommend installing the Jetpack set of plugins – this provides all sorts of useful features, including website statistics, integration with social networks such as Twitter and Facebook, and warnings if your site goes down. You can find a full list of Jetpack features at wordpress.org/plugins/jetpack – and you can find the installer by clicking Plugins at the left of the WordPress interface. You should see Jetpack at the top, where you can click Install Now. If it isn't there, use the Search Plugins box to find and install it. Jetpack is built by the company behind WordPress itself and requires a free account with WordPress.com, the widely used blogging platform. To set this up, simply install Jetpack and click the "Connect to WordPress.com" button.

There are plenty of other plugins to choose from, to enhance your site in various ways. Some work behind the scenes, while others add visible elements – usually in the form of "widgets". Go to Appearance

| Widgets and you'll see a series of widget areas, the main one being Sidebar. Available widgets are listed on the left, and you can drag and drop those you wish to appear onto the sidebar, reversing the process for those you want to remove. For example, by adding the Twitter Timeline widget (part of Jetpack), you can embed your recent posts into the site's sidebar. By dragging Blog Subscriptions onto the page, you can allow users to sign up for updates by email – a powerful feature.

SPIT AND POLISH

You can now take a look at your site by opening it up in a separate tab. It won't be too impressive at this point, but we're about to polish it up. First, we need to reorganise the site's structure so it works as a business website rather than a blog. To do this, go to Pages | Add New, create a homepage – for now this can simply be a placeholder – and click Publish. Now, go to Settings | Reading and, under Front Page Display change "Your latest posts" to "A static page". Choose your new homepage from the Front Page dropdown box and this will now be the page that greets all visitors.

We can add features to the homepage by making use of the three widget areas that appear beneath the text you added when you created the page. Go to Appearance | Widgets and drag and drop widgets into the areas marked Homepage Widget 1-3. Note that you may not see the same arrangement of widget areas if you've selected a different theme to us.

It's now time to start filling out the site content. Create a Contact Us page and click the Add Contact Form button (another function provided by Jetpack), then choose which fields to include and click "Add this form to my post". You'll probably also want an About Us page, plus further pages you're offering relating to the service or product. The WordPress interface is very simple to

use for adding content: to insert images, click Add Media on the Edit Page screen. Inviting visitors to comment on your pages is a good way to add value to your site, but spam can be a problem.

Go to the Dashboard and you'll see a prompt to enable the Akismet plugin. As with Jetpack, this needs to be linked to your WordPress.com account; once you've done this, it will do an excellent job of filtering out junk comments. To keep the net tight, go to Settings | Discussion and select either "Comment must be manually approved" or "Comment author must have a previously approved comment".

THE WORDPRESS ADVANTAGE

Now you can get more ambitious: the walkthrough (**see Installing a carousel and polishing up your site, p94**) shows how to add a carousel to your homepage and smarten up the site. With this done, the first version of your new website should be ready to roll. In the coming weeks, aim to enhance it, adding plugins or widgets to suit your particular customers. You should also install a database backup plugin, so you can make a regular copy of the site in case of disaster.

By choosing a WordPress-based hosting package, you've set up a professional web presence in next to no time, with no need for specialist expertise, and with minimal investment. It's easy to manage and will be SEO-friendly, so you'll have a head start on rising through the rankings, and if you've chosen a responsive theme it will be suitable for viewing on all devices.

It's never been easier to create a high-quality website that will enhance your reputation, so if your business is still getting by with a holding page, it's time to upgrade, and as you can see here, the process is simple, enjoyable and cheap. ●

THINK MOBILE

You'll almost certainly be creating your site on a PC, but remember that people may view it on other types of device. By the end of June 2014, the average e-commerce site received 38% of its traffic from phones and tablets, and that percentage is rising. So it's essential to create a responsive site – that is, one that automatically adapts itself to the multitude of different screen sizes, shapes and orientations your potential customers may use. Fortunately, there are plenty of WordPress themes with responsiveness built in, so the hard work is done for you – you need only adapt the design to your purposes. Also, when testing your site, don't forget to check it on a smartphone to see how the layout has adapted – for example, to discover whether important links are pushed off the bottom of the screen.



HOW TO RUN ANDROID 4.4 ON PC/MAC WITH VIRTUALBOX

Michael McKinnon walks through the steps to take if you want Android running on your PC.

The Android operating system has matured nicely in recent years, and with so many great apps and games available it's a shame that the humble PC or Mac is missing out on all the action.

Well not anymore! Using a few clever tricks and the wonders of virtual computing, it is possible to run your very own virtual Android device on your desktop or laptop computer, and not just a smartphone or tablet.

Installing your own virtual Android machine is a great way to learn about virtual computing (that is, the ability to run a 'virtual' computer using special software) and to learn how to use Android; perhaps if you're thinking about upgrading to a new Android smartphone or tablet device, but haven't made the jump yet.

To get started you'll need to install some Virtual Machine software, and we'll be using VirtualBox which is a free open source project sponsored by Oracle.

STEP 1.

Download Virtualbox and install it (version 4.3.16 at the time of writing this):

www.virtualbox.org/wiki/Downloads
(approx. 105 Mbytes)

To install Virtualbox, simply use what one of my IT friends calls the "Next, next, next install" by leaving all the default options for the best result.

During the installation process you may be prompted to install device drivers and other system files, this is required because Virtualbox needs to access many of the "physical" devices (such as the Network card in your PC) to share with the "virtual"

VirtualBox is a free open source project that's sponsored by Oracle

devices such as the Android one we'll now create.

Next you'll need to obtain the Android operating system software, and for this we're again using an open source project called "Android-x86".

The significance of the x86 is that it refers to the type of processor (CPU) which is compatible with the one in your PC. Almost all new smartphone and tablet devices are based on a different type of processor called ARM, which is why we need the special x86 build of Android in order to run on a PC.

STEP 2.

Download the latest Android-x86 currently 4.4-r1 and download this file: [android-x86-4.4-r1.iso](http://tinyurl.com/n4ypn59) (approx. 360 Mbytes) via <http://tinyurl.com/n4ypn59>

Now that you've downloaded this file, just keep it in a safe place and let's get started with configuring a new "virtual machine" using Virtualbox.

STEP 3.

Launch the Virtualbox software and click the "New" button on the toolbar and on the screens that appear, fill out this information, pressing next between these screens:

NAME:

Android-x86 (or choose any name for yourself as a reference)

TYPE:

Linux

VERSION:

Linux 2.6/3.x

MEMORY:

1024MB (use the slider, or type 1024 in the box)

HARD DRIVE (DEFAULT):

"create a virtual hard drive now"

HARD DRIVE FILE TYPE (DEFAULT):

VDI (VirtualBox Disk Image)

STORAGE ON PHYSICAL HARD DRIVE (DEFAULT):

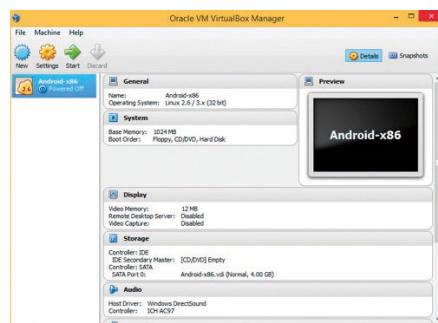
Dynamically allocated

FILE LOCATION AND SIZE:

Leave the filename as it appears, but increase to 16GB; however I have seen reports of people getting away with 8GB and also as low as 4GB. If you can spare 16GB on your PC, choose that.

Now you're ready to press the "Create" button. This will configure a brand new "virtual computer" with exactly the specifications you have just provided, such as 1GB of RAM and 16GB hard drive.

Now that you've created the Virtual Machine that will house your virtual Android device, we just need to make a few small changes so it will boot using the Android ISO image you downloaded earlier in the process.



Configuring your devices

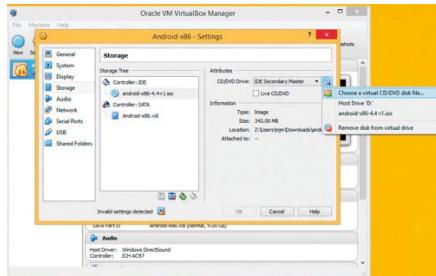
Press the "Settings" icon on the toolbar and in the settings window that appears select "Storage" in the left hand pane, then click on the word "Empty" in the Storage Tree section.

Now click on the small disc icon to the right of "IDE Secondary Master" and click "Choose a virtual CD/DVD disk file..." and now find the Android-x86-4.4-r1.iso file you downloaded earlier.

Press OK to save the settings and return to the main Virtualbox window.

Now it's time to start your virtual machine and install the Android operating system software.



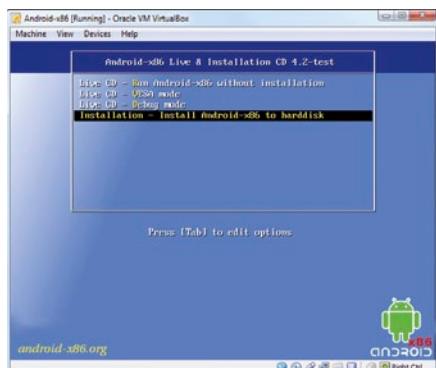


▲ Choosing a virtual DVD disk file for the computer's startup process

STEP 4.

Press the green arrow icon on the toolbar in Virtualbox to start.

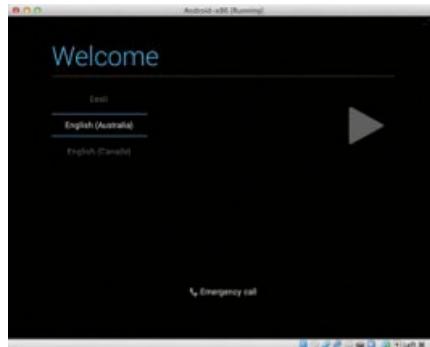
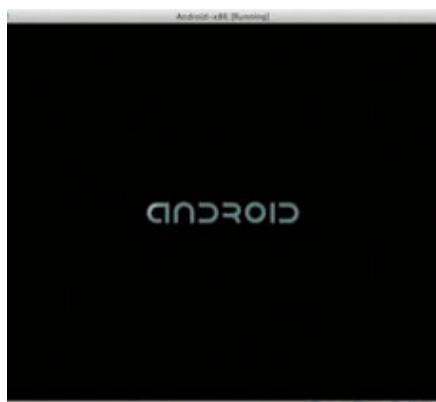
Now that your new virtual machine is up and running it should "boot" from the ISO image we connected in the previous step and you'll see a screen like this:



STEP 5.

Select "Installation – Install Android-x86 to harddisk" after which there are a number of steps you'll need to follow carefully all documented here: www.android-x86.org/documents/installhowto

Some people report getting stuck near the final steps where the virtual machine may appear to freeze or hang – if that happens to you, just wait it out for a while and if it still isn't working don't be afraid to select "Reset" in the Virtualbox window menu or press Ctrl+T – and then resume



▲ The familiar Android configuration screens, but now on your PC!



the steps from Step 4.

Well done! Now that you're seeing Android up and running, you'll need to follow the Android setup wizard which is a series of screens that will ask you to enter your Google Account details (if you have one) and other settings.

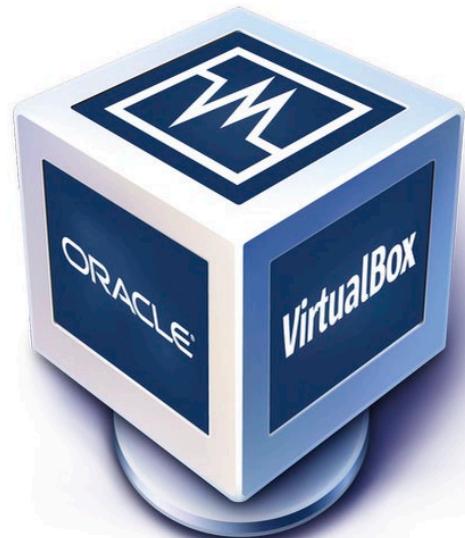
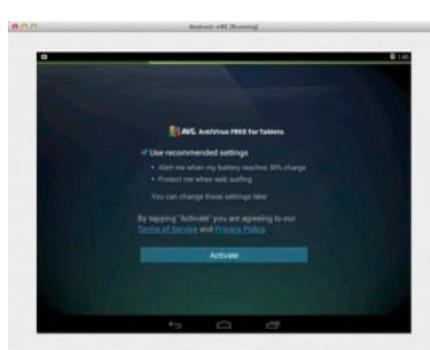
When prompted to Select a Wi-Fi network, you can just skip that step because your virtual Android device should already be connected to the Internet through the Virtualbox software.

Congratulations on installing your very own virtual Android device to play with and I hope it gives you hours of fun and enjoyment!

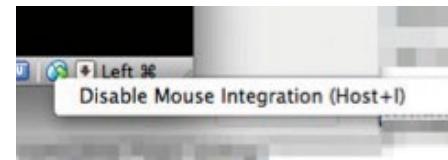
And don't forget to install AVG Antivirus for Android :-)

FINISHING TOUCHES

Since Android was designed for touch-screen devices, and your PC has a mouse



"it is possible to run your very own virtual Android device on your desktop or laptop, and not just a smartphone or tablet."



instead we just need to tell Virtualbox to draw a mouse pointer on the screen so you know where you are!

At the bottom-right of the virtual Android device window are some settings – you'll need to find "Disable Mouse Integration" and turn it on for the best experience possible.

The default screen resolution that your virtual Android tablet will use resembles that of a tablet device, but if you want to simulate a smartphone instead you'll need to tweak a hidden Virtualbox configuration setting for this.

I would only recommend this for advanced users comfortable with editing a configuration file using a text editor.

(Advanced Users Only) Follow the instructions provided here:

<http://stackoverflow.com/questions/6202342/switch-android-x86-screen-resolution>

The native screen resolution for an Android Nexus 4 smartphone is 768 x 1280 but I've found this doesn't fit nicely on a PC screen, try 576 x 960 instead.

Michael McKinnon is a passionate PC enthusiast and Security Advisor with AVG

DVD CONTENTS

Apps, essentials, full software, drivers & more!

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INSTRUCTIONS: Open Windows Explorer, navigate to your DVD drive and double-click Index.html in the root directory. **DISC PROBLEMS:** To replace faulty DVDs, please send the discs to: PC&Tech Authority DVD Replacements, Level 5, Building A, 207 Pacific Highway, St Leonards NSW 2065

Make sure to include your name and postal address on the back of the package so that we know where to send the replacements. For all other DVD related issues email cd@pcauthority.com.au. As the delivery platform only, PC&TA and Haymarket Media cannot and will not provide support for any of the software or data contained on these discs. Although all discs are virus scanned, Haymarket Media cannot accept any responsibility for any loss, damage or disruption to your data or computer system that may occur while using the discs, the programs or the data on them. There are no explicit or implied warranties for any of the software products on the discs. Use of these discs is strictly at your own risk.

BITDEFENDER INTERNET SECURITY 2015

Bitdefender Internet Security 2015 is the company's mainstream security suite, offering antivirus, firewall, browsing protection, parental controls, antispam, password management and more.

There are plenty of features to explore, but a revamped interface means the most common tasks (Quick Scan, Update, Safepay, Optimize) are now available with a single click, while wider groups of functions are accessible via three main tiles (Protection, Privacy, Tools). Even first-time users will quickly find what they need.

The focus on ease of use continues

elsewhere. Bitdefender's Wallet can now automatically fill web forms with user names, passwords, even credit card details, often allowing you to pay online in a single step. And Bitdefender's Vulnerability Scanner not only finds missing patches on your PC, it also provides links to help you download and install them.

REQUIREMENTS: Windows XP, Vista, Windows 7, or Windows 8 · 100MB hard drive space

LIMITATIONS: 90 day license

WEBSITE: www.bitdefender.com

ASHAMPOO PHOTO CONVERTER 2

Editing one image is easy. Editing 20, 50, maybe 100 is much more tedious, especially when you're carrying out the same operations over, and over again.

Ashampoo Photo Converter can help by automatically performing the edits you need on an entire folder of photos, all in a single operation.

The program can resize, rotate, mirror or flip your photos, for instance. There are options to tweak gamma, brightness, contrast, hue, saturation and colour temperature, as well as adjusting colour depth. Your photos can be improved by optimising their colours and contrast, running a sharpen filter, even cleaning skin or removing compression artefacts - all entirely automatically.

There are plenty of more advanced tasks. Would you like to add an image watermark to your photos, maybe? Add drop shadows, convert them to oil paintings, maybe pencil sketches? It's all here. These effects can be combined, too. So you might take a thousand images, create custom thumbnails, optimise their colours, convert them to oil paintings and add a drop shadow, all in a few minutes (and most of that will be watching Photo Converter work).

Whatever you're doing, the finished results can be converted to a range of formats, and not just the usual JPG, PNG, BMP and so on: there's also support for saving JNG, JXR, MNG, TIFF and other image formats, and you can even save them as PDFs.

BACKUP4ALL 5 LITE

Backup4all is an easy-to-use but very capable backup tool, available in three different versions. The Lite edition is aimed at home users, but still offers all the core functionality most people will need. You can specify the files and folders you'd like to back up; these can be saved to local, external or network drives; there are options to compress your archives, or password-protect them for security; and a simple scheduler can automatically run your backup jobs every day, week or month.

Restoration is just as straightforward, because your backups are just mirrors of the original files and folders, stored in regular zip files. Simply open an Explorer folder and you'll be able to find and recover what you need in seconds.

The latest version 5.0 brings a lot of changes, and we've mentioned some of the most important already: every edition benefits from the revamped, more customisable and easier-to-use interface. You can now suspend, cancel or stop all backup jobs. The program is able to run scheduled jobs it might have missed, and there are new tools to both test and repair your backups.

If you want more, Backup4all Professional is the obvious choice. This supports full, differential and block-level incremental backups, each of which can be secured with 256-bit AES encryption. If local backups aren't good enough then your archive can be saved to FTP, SFTP, Azure and Amazon S3 destinations, and email notifications will ensure you're up-to-date with the current backup status.

DISK TUNER 1.0

Disk Tuner is an easy-to-use tool for cleaning and defragmenting your hard drive. The program opens with a clean Windows 8-like interface. The Cleaner scans your hard drive for junk files, browser histories, system leftovers and more. It's very straightforward: click "Scan", the program checks your PC and reports on whatever it finds, and clicking "Clean Now" quickly removes everything.

The Duplicates File Finder checks your system for duplicate files which might be wasting drive space. It's just as simple: all you have to do is choose a root folder, click Search and wait for a while (there's a lot to do).

Disk Tuner scans that folder tree, reporting on any duplicate files it finds, and you can select and delete whatever you items you like.

The Defrag function aims to optimise the layout of your files for the best possible performance, but this feature can't be accessed within this edition. You'll need to upgrade to the latest 2.0 to access the Defrag component. Finally, two system

status tiles keep you up-to-date with your PC's security, alerting you if your firewall or antivirus tool is disabled.

MAGIX MUSIC MAKER 2015 SILVER

MAGIX Music Maker 2015 Silver is a versatile music creator with plenty of powerful features, yet can also be used even if you've no musical experience at all.

The program opens with the arranger, a multi-track area where you can build your own songs with the hundreds of samples on offer - bass, drums, guitar, keyboards, strings, vocals and more.

If you're not sure where to start, there are three demo projects which will get you up-to-speed immediately. "Demo HipHop Basic" is a great example, a real song which sounds like it could easily be used over the opening credits of a film, and you'll be able to tweak and adjust it however you like.

Alternatively, drag and drop an MP3 onto the arranger and MAGIX Music Maker 2015 Silver will import it. You're then able to customise the track by applying a host of effects: delay, reverb, filters, compressor,

distortion and more. And if you're not sure what any of these do, just click Play, drag the slider or spin the dial and you'll hear a live preview of the results, making it quick and easy to find what works best.

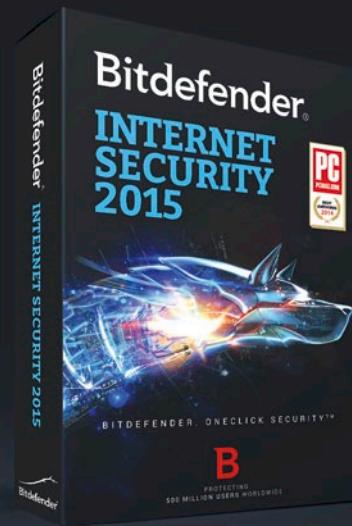
You can even drag and drop Music Maker's samples onto the arranger and it'll try to adjust their tempo, so that everything works correctly: a great way to build custom remixes of your favourite tunes.

There are plenty of other tools to explore, from beginner-friendly wizards to build songs from scratch, to advanced effects and a powerful synthesizer.

And when you've finished, your project can be exported as an MP3, OGG, WMA or WAV file, or uploaded to Magix Online Album, ready to share with the world.

Please note, the program initially installs as a 7-day trial. To convert it into a full version, click "Register now for unlimited use" on the opening screen, complete the web registration form, and an activation key will be emailed to your immediately.

FREE FULL VERSIONS: Each month, we offer *PC & Tech Authority* readers full registrable versions of some software on the DVD. See the installation instructions in the DVD menu to complete registration, if applicable. **IMPORTANT:** Full product registration closes on 13 January 2015



"supremely simple"

July 2014

Editor's Choice by PC Mag. Three Years in a Row



Bitdefender®

<http://www.bitdefender.com/solutions/total-security.html>



INPUT OUTPUT

Dan Rutter delivers tech wisdom for your dilemmas

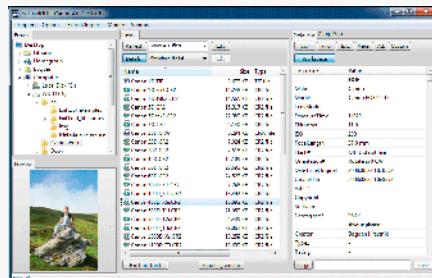
PEOPLE SAVED A LOT OF FILES ON JANUARY 1, 1970
For a while either my computer had the wrong date set, or a utility I used to batch-process my photos messed up the date. However it happened, I now have a couple of hundred photos in my collection, AND MY BACKUPS, that are all dated January 2000. I relied on the date to find photos from particular events among all the indistinguishable IMG_XXXX filenames, and now that's all messed up.

I've noticed that the FILE dates on the photos are fine, though. Both "Date" and "Date Modified" have the right date for all of them. My photo indexing thing only looks at the EXIF information, though, and that's wrong.

Is there some way to copy the system date into the EXIF information, without individually editing every photo?

JACOB F.

Matthias Wandel's "jhead" (bit.ly/mwjhead) is a command-line program that can do this, as well as various other EXIF twiddling. The somewhat more opaque ExifTool (bit.ly/exiftool) can do it too. (They can also both do the opposite - copy the EXIF timestamp to the file time.)



^ ExifTool is a fantastically useful utility that gives you the power to edit image EXIF information

I BLAME SHEOGORATH

Why does Skyrim crash to desktop before even making it to the game menu if I have a random selection of my zillion mods enabled? [Pics attached, which I hybridised into one tall skinny monster.]

This is a new computer, but I'm using the same old Steam directory on my data drive. I don't think I've changed anything. When I looked online for help I found a load of stuff about blanking the .ini files,

making sure you're running with the right account security to modify files, getting Steam to "verify integrity of game cache"... none of which seems to help. Start launcher, click "Play", then I get the initial video and theme tune, but if I click the mouse to go to the main menu then it's straight back to the desktop. Help!

SARA EADES

My eagle eyes and long painful familiarity with the way Bethesda games do things allowed me to detect that you don't have Dragonborn.esm, the game resource file for the Skyrim DLC of the same name, selected in your data-files list. You've got the other DLCs Dawnguard and Hearthfire (which for some reason has the filename hearthfireS.esm...), but Dragonborn is sitting unselected down at the bottom of the order.

In Oblivion-engine Bethesda games, DLCs and most mods are all just data files, .esms and .esp's in the data-file list, which can be selected and thus used by the game. Or not. Many mods, especially when an Elder Scrolls or Fallout game has been around for a few years, use resources from one or more of the standard DLCs. If you don't have that DLC, or do have it but, as in this case, don't have it selected, this can cause an early and mystifying crash-to-desktop. Disabling the mods that use those DLC resources will prevent the crash, but won't show you why it was happening in the first place.

ANCILLARY INCOMING CALL NOTIFICATION: \$5/MONTH

Why do mobile phones make that distinctive annoying interference noise? You know, "bip-a-dip bip-a-dip bip-a-dip", and then if it's actually going to ring a long "bzzzzzzz"... but then the interference gets much QUIETER when you answer the phone!



^ For some reason Really Useful Dragons and Schlongs of Skyrim aren't on this list.

I've heard these noises on the car stereo, my home stereo, through computer speakers, in YouTube videos, in Skype conversations. Why is this radio noise in particular so prone to show up precisely where it's not wanted?

JAZ OLSEN

Any circuit with a diode-ish thing in it can act as an accidental radio receiver, and all conductors with changing currents flowing in them act as radio transmitting antennas. Result: Interference, between all sorts of different electrical devices, from power cords to particle accelerators.

Most sources of radio interference aren't actually meant to be broadcasting anything, and aren't very good at it. But mobile phones are *made* to emit electromagnetic energy. Despite their tiny antennas, they have to make themselves heard to a cell transceiver that's probably quite distant. A phone also has to periodically check

to make sure it can hear the cell antenna in return - otherwise it won't know about incoming calls.

The reason why you hear phone-signal noise through random other electronic devices is a combination of the relatively high power of the phone's transmitter, and the lousy shielding of those other devices.

v "I'm sorry I can't hear you over the sound of my phone's poorly shielded electromagnetic buzzing"





▲ For best results, do not position teams of stick-welders next to computer speakers.

Device manufacturers can get away with bad shielding most of the time, since most people don't live next door to military search radars or arc-welding shops. Your computer speakers may hum noticeably if you put them right next to a PC with no case on it, but most people don't do that, so they can get away with it. And government electromagnetic-radiation regulations require only that devices survive incoming interference, not that they refrain from making an annoying noise in response to it.

The reason why the periodic "bip-a-dip" you hear at seemingly random moments is so loud on devices that're susceptible to interference is that the phone is checking in with the local cell at something close to its full transmit power, to make sure the cell tower can hear it. The long "bzzzzz" of the initial digital handshake occurring between phone and cell tower when a call connects is, similarly, conducted at high power. Once that's done, though, the phone can usually step its power way down to save its battery, because it's figured out how quietly it can talk and still be heard by the cell. If you're in a difficult reception area and the phone has to stay at full power, the interference will stay at full volume too.

(Interference from modern cellular and home cordless phones never sounds anything like a normal phone call, by the way, because for years now they've all been digital, not simple analogue transceivers that an ordinary radio could tune to.)

This interference problem can be completely cured by simply wrapping your phone in radio-blocking aluminium foil. But the practical effect of this is the same as the somewhat cheaper option of just turning the phone off.

I/O OF THE MONTH



PRAISE THE SUN!

I just read the letters column in which you gave your verdict on suspiciously cheap eBay USB crank-handle chargers (not very useful, not very dangerous, fun!). I note the person who sent the letter also mentioned USB solar panels - not solar-charger batteries, just little solar panels with a USB socket coming out of them. I also note those sell on eBay for only about \$5.

So my question is obvious: What about those? Useful? Dangerous? Fun? All of the above?

E. GIBBR



I love how USB is turning into an ad-hoc low-voltage gadget standard. Little USB lights, fans, speakers, chargers, FM transmitters, cup warmers, battery packs, dynamos... and solar panels. So I bought a couple of the panels, and tested them.

I got two of the "2 watt" ones, which sell for about \$10 Buy-It-Now, or less if you get lucky in an actual auction. They're thin and light hand have a smaller footprint than a paperback book, so are feasible to carry around everywhere.

As with the crank charger, these things do not seem likely to blow anything up. In bright sunlight they output a little over seven volts into no load, but that's unlikely to hurt any USB devices and, at any rate, falls to five volts or less whenever something asks the little panel for some actual power.

Also as with the crank charger, though, there's no guarantee that these panels will work with any particular USB device. Completely "dumb" devices like a simple DC-motor fan will almost certainly run fine; I have a couple of fans that draw an

almost perfect standard-USB 2.5 watts from a five-volt computer USB socket, and each of the solar panels will run that fan at a tolerable speed from even moderately overcast sunlight. Behold: The sun that heats you up can also cool you down!

But a small Android phone that charged happily, if slowly, from the crank charger absolutely did not want to know about electricity from the solar panels. I even whipped up some socket-to-plug USB-connector multi-adapters so I could run two panels in parallel for more current - or run multiple low-power devices from one panel! - but the little phone still wouldn't go into charge mode, though the same two-wire power-only USB cable charged it fine from a computer. A Kobo e-book reader charged happily from one or two panels, though - two panels giving full basic-USB charging speed, in good sunlight.

And, more practically, a USB battery pack that does charge everything I've tried it with will also receive charge from a solar panel, at a perfectly acceptable 150-odd milliamps in unremarkable sunlight. So you charge the unfussy battery pack from solar, and you then charge fussy stuff from the battery. Done.

You won't be charging anything without reasonable sunlight, of course, but given that you can leave a solar-charging setup sitting there for a few hours (try not to leave the thing being charged heating up in direct sunlight too...), one of these "2 watt" panels actually is a practical charging option for any USB device that'll deign to accept electrons from it.

The solar panels also, like the little crank charger, make a neat science demo. I know that a "solar flashlight" is a punchline, but the extreme efficiency of underdriven LEDs means just about any USB-powered LED lamp will light up from surprisingly little light falling on the solar panel. This is of course not actually much use for anything, but it's great for demonstrating the technology, even at night – just hold the panel near a lamp and it'll light LEDs!



< I hope you people appreciate how much SCIENCE!! I do for you.



"TO EAT HUMBLE PIE, IN COMMON USAGE, IS TO APOLOGISE AND FACE HUMILIATION FOR A SERIOUS ERROR"

Polished, coherent and reliable. The Windows 10 beta has landed, and it's enough to get **Jon Honeyball** genuinely excited

Can you hear that very loud chomping noise? It's the sound of the Windows division of Microsoft in Redmond scarfing down humble pie. Let's not overlook the contribution of the marketing and PR departments either, all of whom now have their collective snouts buried in the pie crust. As for the numerous Microsoft apologistas out on the interweb, let's just say that I'm also highly amused to read about how unhappy they are. And the reason for this orgy of pie consumption? The Windows 10 public beta has landed, and it really is very nice indeed.

Even in early beta form, it's polished, reliable and works well. In fact, I'd go so far as to say that I'd prefer to use it today, despite all its numerous wobbly bits internally, over mature Windows 8.1. Do bear in mind that, in my dotage, the enthusiasm for running beta software on important hardware has waned. In youth I was gung-ho about this sort of thing and still bear the scars. I'll always remember trying to resurrect my Exchange server after I'd put a beta of 4.5 onto it (which actually was called 5.0 on release, before you email to tell me it never existed). I finally got it working at 5.15am after pulling an all-nighter, just as the taxi was arriving to take me to the airport for a week-long business trip... sigh.

Out of interest, I just dipped into Wikipedia to look up the definition of this particular pastry-clad foodstuff: "To eat humble pie, in common usage, is to apologise and face humiliation for a serious error. Humble pie, or umble pie, is also a term for a variety of pastries based on medieval meat pies. The expression derives from umble pie, which was a pie filled with the chopped or minced parts of a beast's 'pluck' – the heart, liver, lungs or 'lights' and kidneys, especially of deer but often other meats. Umble evolved from numble (after the French nomble), meaning 'deer's innards'."

Fascinating stuff of which I wasn't



JON HONEYBALL

Jon is the MD of an IT consultancy that specialises in testing and deploying hardware
Twitter: @jonhoneyball



▲ Windows 10 sports the Start menu that 8 should have shipped with

aware, and it strikes me that from a certain perspective umble is a pretty fair description of the pile of steaming components that went in to make the whole Windows 8/8.1/RT debacle. The result was, not surprisingly, offal/awful (if I'm permitted to stretch the pronunciation a bit).

So what's changed? Well, Microsoft received a roasting from all quarters. I doubt it took much notice of my whining, but the company certainly took notice of the massive slide in sales of laptops, Ultrabooks and desktops. And that's to say nothing of the stony silence it received from its corporate customers, many of whom compared Windows 7 and Windows 8 and responded with a "we'll stick with 7, thanks all the same".

Microsoft also took notice of the catastrophic financial calamity that was its early Surface adventure. Recent figures suggest that the Surface Pro is still barely managing to make any sort of headway in terms of sales, which is a pity given that the Surface Pro 3 has matured – in a typical Microsoft "three versions to get it right" kind of way – into a tidy device. (That's if you can get your head around its bizarrely implemented convertible nature, the need for supermodel-length legs if you want

it to sit on your lap, and a price tag that takes the term "reassuringly expensive" to startling new heights.)

The spin doctors will try to tell you that Windows 10 is just the next logical step on the ongoing journey that started with Windows 8, and that everything is just tickety-boo. What rampant nonsense! This is one of the sharpest, most screeching U-turns to be heard of in the software world in recent years, but I'm still glad Microsoft had the guts to do it. Ridding the company of former Windows head Steven Sinofsky and others, plus Ballmer, has allowed the team to take a far more pragmatic view about where Windows is going in the near and medium terms.

Windows 10 contains a lot of engineering work that's interesting and worth pursuing – I liked the idea of Metro/Modern apps, it's just that the initial API offering was weak, and not being able to run such apps in a window in desktop mode was simply stupid. I still like the idea of apps that share much of their core code across a wide range of devices; it saves a lot of developer effort and potentially leads to higher-quality software by ensuring that the shared parts are tested more thoroughly. But this assumes that the platform-specific bits (and the many bugs therein) aren't too constraining.

So what's different in Windows 10? For

a start, fire it up on a desktop machine and you'll see a desktop. Press the Start button and you'll get a rather delicious new Start menu that brings together the best aspects of traditional Windows with new tiled components from the Modern interface. Fire up a Modern app and you can drop it into a window on the desktop to work alongside normal desktop applications.

"I still like the idea of apps that share much of their core code across a wide range of devices"

If you do have a touchscreen, then that's just fine, but the OS is equally happy with a proper keyboard and mouse. Firing up Windows 10 on a tablet will go into touch-orientated Modern mode first – and Modern remains its default operating mode – but it can drop back to desktop if you wish. While you're in desktop mode on a tablet, pressing the Start button takes you back to a full-screen Modern environment, rather than the desktop-orientated Start menu, which is exactly right for this hardware target. And finally, on those convertible devices where you can attach and detach a keyboard, the system will automatically switch between these two ways of operating, which yet again is just as it should be.

Quite why such flexible operation was never envisioned by Sinofsky and his team is beyond me. It should have been glaringly obvious from the very beginning that Windows 8's Modern environment was a workable experience on touch-enabled devices, and that its desktop mode was a legacy afterthought. At the time, I said that desktop mode should have been banished, and that Windows 7 should have had its kernel updated and been rebranded as Windows Corporate or some equivalent change. But of course this wasn't feasible because the other great ivory tower at Microsoft, the Office team, had nothing ready for the Modern environment (and indeed still doesn't). Ramming Windows 8 down the throats of Microsoft's corporate and business customers may have been the last gasp of the old guard, and if so then it's no bad thing at all.

In conclusion, I'm actually excited by Windows 10. On Intel-based desktops and tablets, it's an OS that has coherence, clarity and purpose. How well this will scale down to Windows Phone is another matter, but that division seems to be limping along badly with minimal market share and relevance. Last week I bought

> Although a highly polished product, Fusion's upgrade cost can't be justified

a pair of Nokia Lumia 630 phones running Windows Phone 8.1, which is an adequate combination, and I could see how you might get to like it; however, I'm afraid I feel no real love for it. With the future arrival of the Windows 10 platform, maybe that will ultimately change for the better.

TEN TEN

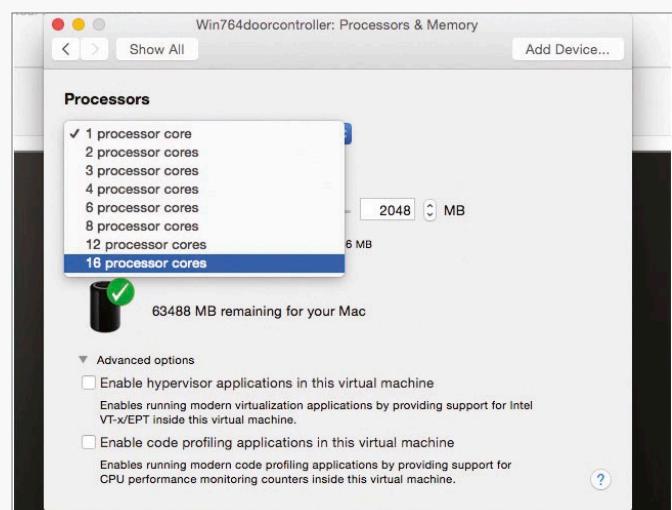
As I write this column, Apple's OS X 10.10 is in its Gold Master Candidate phase, with final release only a few days away. We already have final iOS 8.x, which has been experiencing a few bumps since its launch. Best not to talk about 8.01, but 8.02 is certainly better, although there are still significant issues with Bluetooth on the new iPhone 6 and 6 Plus devices, as evidenced by the wailing from vendors such as Tile, which has had to produce new firmware for its devices to make them work with the 6/6 Plus. Hopefully, 8.1 will properly iron this out.

It's notable how the uptake of 8.x is slower than previous versions, but I was reading some analysis just this morning about how the unusually large size of the over-the-air update was impacting on those older iOS devices that have smaller amounts of RAM. As long-term readers will have come to expect, I bought my own 6 Plus with the full 128GB of RAM, but I'm hearing that it's hard to squeeze iOS 8 onto a 16GB iPhone that's already loaded with music, apps and videos.

I'm starting to love the homogeneity of 10.10 when used alongside 8.x. I like the fact that when my phone rings it pops up on my desktop too, so I can take the call from there if I so wish. This seamless integration of desktop, tablet and phone is certainly a more complete reality on the Apple platform than on any other (and I could point to the shameful disconnect between some big-name Android phones and the large, shiny smart TVs from the same vendors to reinforce this point).

VMWARE FUSION

I upgraded my VMware Fusion Pro licence to the new version as soon as it shipped. I love this software – it's polished, stable and



performs very well, especially on the Mac Pro, where you can throw large numbers of CPU cores and RAM to individual VMs and make use of the stupidly fast storage. Yes, there are occasional wobbles, but they've been few and far between in my experience. I've been running some VM images that contain several dozen snapshots, amounting to VMware files of up to 400GB. Some other people prefer the virtualisation offering from Parallels, and I have no problem with that choice. Back in the very earliest days of virtualisation, I used Parallels myself, but I haven't touched it since. I've heard rumblings on the intertubes about problems with the current version, but your mileage may vary.

If I have one gripe about Fusion, it's the pricing structure. I don't mind the retail price, but I do gripe about the upgrade cost. At least to the user, there isn't enough differential improvement to justify the large annual upgrade cost. I'm prepared to believe that miracles may have wrought under its hood, and that the upgraded product is dripping with the sweat of thousands of highly paid developers, but from the outside it's difficult to see what I received with this new version. A product that reaches maturity and settles into a maintenance mode needs to justify its annual upgrade cost properly, which at this point has in effect become a maintenance agreement. For the record, Fusion costs \$76.25 to buy and \$54.45 to upgrade, which seems quite rapacious. Fusion Pro costs \$163.50 to buy and \$87.15 to upgrade, according to store.vmware.com. This may be a special new-user price for Fusion, in which case why isn't there an equivalent for Fusion Pro too?

KEYBOARD KUDOS

Back in the mists of time, I had an IBM AT keyboard. This was made of solid metal and weighed half a ton; I'm convinced



< The Matias Quiet Pro for Mac is a solid keyboard, instantly improving my typing speed and accuracy

that it could have been used to commit assault and battery or for smashing your way into a house. It had a sheet-metal base, solid-cast upper casing, and its keys were individually mounted on springs with a gorgeous over-centred click action. If I remember rightly, these were based on the key action of the legendary IBM "golf-ball typewriter", which was built like a battleship and priced accordingly. The IBM AT keyboard was also horrendously expensive, but worth every penny.

In recent years, the computer industry has shunned such exquisite keyboard engineering, ripping out every last penny of cost it can find. At today's prices, you could probably buy a complete desktop PC for the inflation-adjusted price of that IBM AT keyboard, which should indicate how much of a dinosaur it is. But typing on a modern keyboard is a miserable experience.

Far too many of them are merely laptop keyboards in drag, where minimal key travel and thin weedy key tops are the norm – such skimping may be a requisite to maintain a laptop's thinness, but it's totally unnecessary for the desktop. According to one friend's memorable description many years ago, it's like typing on "dead flesh", and it slows down typing and introduces errors. So imagine my utter delight to stumble upon the Matias Quiet Pro for Mac (www.matias.ca/quietpro/).

This has a full set of function keys up to F18, an Eject button, and also those sound volume-adjustment functions on F10, F11 and F12 for Mute, Volume Down and Volume Up respectively. At US\$149.95, with the promise of quick delivery, I couldn't stop myself.

It arrived a few days later. I plugged it into my Mac Pro and it brought about a transformation. Sitting much higher than a standard Apple keyboard, its keys have a

proper feel, meaningful travel and audible feedback. If I were being picky, I'd have preferred a more over-centred sprung action, but the key movement is still positive with a solid end-stop.

It was a revelation: my typing speed and accuracy were instantly improved and it felt like re-meeting an old friend. Build quality isn't up there with that original IBM AT dreadnought, but it's heavily built and solid by modern standards. And did I mention the three – yes, three – USB 2 sockets available on the keyboard itself? They're ideal for a mouse, USB sticks and so forth. A recommendation is mandatory, and I'll be returning to try out some other devices soon. Oh, and ten out of ten for stating "we currently have stock available for delivery

"The world of 4K video is currently full to the brim of claims, lies and outright deception"

on..." followed by tomorrow's date, and then meeting that delivery time too.

BANDWIDTH BLAG

It seems the world of 4K video is currently full to the brim of claims, lies and outright deception. I've previously covered my angst with Aja over its lo 4K device, which simply didn't do what it claimed for months on end. When I unleashed the full force of my temper at the company's product manager, he admitted that it didn't work, but that there was beta firmware I could try if I was prepared to sign a non-disclosure agreement (which gave it perpetuity rights to use anything I said to them for any purpose whatsoever). I politely declined.

The problem is that processing UHD p60 video is difficult. By that I mean 3,840 x 2,160-pixel definition at 60Hz with chroma subsampling of 4:4:4, requiring a total bandwidth of just over 18GB/sec, which

is frankly terrifying. At eight bits to the byte, you're looking at 2.5GB of data per second – and you thought your SSD was quick? There are ways to ameliorate the situation somewhat: you can reduce the colour depth to 4:2:0, which drops the data rate to 10.2Gbits/sec (a notional 1.28GB/sec), or you can stick at 4:4:4 and reduce the frame rate to 30fps, which gives the same 10.2 data rate. Is it any surprise that manufacturers are struggling to make this actually work?

I've been impressed by the work being done by Blackmagic Design (blackmagicdesign.com/uk) on its video products – and this is a firm that makes it perfectly clear what the real capabilities are. Like most in the pro video world, it prefers to use serial digital interface (SDI) cabling rather than the consumer HDMI. SDI has locking BNC connectors and proper

cable, which can run at various speeds known as 3G, 6G or 12G in Blackmagic's parlance. 3G is HD, 6G is UHD at 30p, 12G is UHD at 60p full-colour depth. The firm is about to ship a new broadcast camera capable of 12G SDI, and the cost is less than you might think.

LOL

If you're looking at HDMI 2, and UHD in particular, then pay careful attention to the specification that's actually being delivered. Even big companies such as Sony can be somewhat coy about the actual capabilities being delivered. Frankly, it's all a minefield at the moment. But note that my Mac Pro, with its Thunderbolt 2 connections, can run a video stream at the full 18Gbits/sec. (Thunderbolt 2 can go at up to 20Gbits/sec, which is the deal-maker when it comes to working with UHD p60/4:4:4 video.) Sorry, did someone just say USB 3 was good enough? Excuse my laughter. ●

"THIS GPS TRACKER HAS NO REAL BRANDING BEHIND IT, BUT IS EARNING ITSELF A GREAT REPUTATION"

The RF-V16 may be a little clunky to configure, but this tiny device packs a wealth of features into its diminutive form

I'm always surprised by how frequently the subject of mobile tracking comes up when readers contact me. Recently, I've had questions about ensuring the safety of a vulnerable elderly mother with dementia who's prone to wander; keeping tabs on expensive kit such as generators and diggers left on a construction site overnight; allowing kids to play in the park, but not to wander too far; and, as I described in issue 199, enabling friends and family to track the progress of a student on a round-the-world trip. Over the years, I've covered numerous tracking products that employ Bluetooth, GPS, satellite or proprietary communications, and each had its good and bad points.

I mention this because I've stumbled across a new device that's rather good, and could easily cope with several of these tasks. It's a typically anonymous Chinese product that goes by the name of RF-V16 and has no real branding or marketing behind it. Nonetheless, it seems to be earning itself a great reputation on various forums and review sites.

It's tiny – imagine a box of matches with a bit chopped off one end to make it almost square – and remarkably light, weighing just under 30g – a little less than three pound coins. It isn't only a tracker, either, but also a mobile phone: incredibly, its designers have packed a GPS receiver, a phone, a microphone, a loudspeaker and, of course, a battery into this tiny package.

Before I look at how the RF-V16 works, there are a couple of important caveats to mention. First, although its phone is quad-band, it's strictly GSM-only, which means you can't insert SIMs from 3G-only networks such as Three (or any of its MVNOs, such as Shebang) – they simply won't work. The second thing that might worry some readers is its clunky user interface: while the buttons on the device itself are clear enough, its associated mobile apps and website are rather rough-

edged. You have to configure the unit using a sequence of specially formatted SMS messages, which isn't the sort of slick operation you expect from technology in the year 2014.

I hope this doesn't put you off, though, because this device is worth a little perseverance. The 1 and 2 buttons – the smaller ones at right angles to the larger S button – are for dialling two preprogrammed numbers; once the call connects, you use the RF-V16 like any other phone in hands-free mode. This would be great for kids, for example, allowing them to easily call their parents. The RF-V16 can



▲ The RF-V16 is tiny and lightweight

also receive calls, but how they're handled depends on the way you've configured the device. By default, the user must press one of the buttons on the front to answer a call, but you can program it to auto-answer after a certain number of rings.

A third method answers incoming calls silently, allowing the caller to listen in without the RF-V16 user even knowing they've been called. This mode would be great for stealthily checking up on a vulnerable elderly relative without worrying them, but it could easily be abused for far more devious and nefarious purposes.

When it comes to the buttons on the front, I'm going to have to disappoint you: the big S doesn't summon Superman. Instead, when you press it for five seconds, it sends a text message – including details of your location – to up to five phone numbers, then starts phoning around those numbers until one of them answers. Once again, this would be marvellous for kids

who are old enough to be out on their own but not old enough to use a proper mobile.

Thanks to the unit's small size and weight, the easiest way to deploy it is to attach a lanyard and sling it round your neck. Its lightweight qualities also make it easy to attach to other objects you want to track, especially the likes of radio-controlled planes and drones, where payload weight is critical.

A website and two apps – for Android and iOS – ostensibly allow you to track the device on a moving map, but they aren't particularly effective or user-friendly. For example, the website offers a geofencing facility that's supposed to alert you whenever the device leaves a predefined area, but I wasn't able to make it work.

"It isn't only a tracker, either, but also a mobile phone"

By far the best way to interact with the device is via its text-message-based interface. To use this, you first need to send the RF-V16 a command that sets a master phone number from which to control the device. You do this by sending an SMS in the format "123456,sos1,xxxxxxxxxx#", where the Xs represent the phone number from which you'll be issuing commands. From now on, the device will accept instructions from only that phone number. This doesn't provide the best security in the world, since phone numbers can be spoofed – especially when using VoIP – but it's adequate for this application.

After you issue this sos1 command, you'll probably get a reply in Chinese, so the next thing to do is switch the language to English, using the command "lag,2#" from your now-registered phone. Next, you should change the default password ("123456" in the first command above) by sending it a message in the format "old password,t,new password#".

Many other commands are listed in the manual, the most interesting of them being "dw#", which reports back the tracker's current position. It's actually quite clever: if it has a GPS signal, it will use it; if not, it



PAUL OCKENDEN

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will report an approximate location using cell-tower triangulation. The received text messages will include a link to an online map that you can just open on your phone.

Incidentally, I've no idea from where the weird naming convention for such commands sprang: "t" to change password; "dw" to report position; "jy" to put the device into silent monitoring mode. They seem a little random, but you'll only use a couple of them, and they're easy enough to remember.

If you decide to try the Android app, you may find that it will download but not install, even if you set it to allow untrusted apps. This seems to be a common problem, and there's an easy solution: instead of trying to open the file from your web browser or Android's built-in Downloads app, locate it using a file manager app. There are plenty of these, but I particularly like ES File Explorer. You'll be able to open it from there.

I ought to mention the RF-V16's battery life. I turned off auto-updates so that it wasn't constantly uploading its position to the website and the app, and queried it only via text message: after a week's use there was still more than 50% of charge

remaining. When you consider the size of the battery inside this device – it's the size of a postage stamp – that's astonishing. Better still, the device will send you a text message when its battery has run down to 10%, so if you're using it to monitor a vulnerable person, you'll have 24 hours or so to recharge it. It will even send you a text alert if someone changes the SIM card.

There are a lot of really well-thought-out features in this little unit; it's just a shame its apps and website are so clunky. But whether you're looking for a way to protect a vulnerable person, track a flyaway model aircraft or trace valuable products, this tiny unit is ideal. I'm using a giffgaff SIM in mine, because your credit won't expire as long as you make or receive a call or SMS message every six months, which is ideal for a low-usage task such as this.

If you want an RF-V16, one of the best places to look is eBay. There are a few Australian-based sellers offering the RF-V16 at a premium; a few Far Eastern sellers pretending to be in Australia (people normally mention in the feedback whether the goods were shipped from overseas); and a handful of sellers stating honestly that they're based in China or Hong Kong.

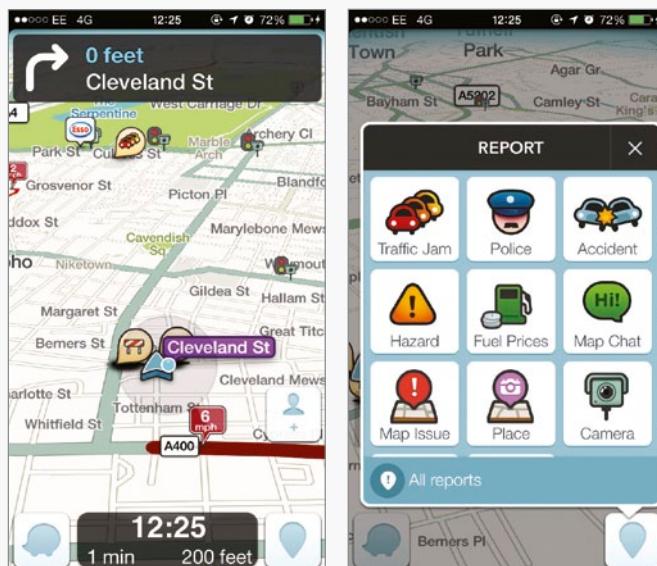
I bought mine from a Chinese seller by the name of taobaotown for \$55, including postage. It arrived in less than two weeks, and the seller was helpful when I had a question about the product. Other vendors are available but, as always with eBay, check the recent feedback before buying.

SATELLITE'S GONE...

I'm going to give you a final report on the Globalstar GSP-1700 satellite phone before I have to send it back to the manufacturer. I'm returning it with mixed feelings. When it works, it's great. The Globalstar satellites fly in low Earth orbit (LEO), so there's little delay when you speak to someone – the "birds" are 1,400km above you, as opposed to more than 42,000km for systems whose satellites are in geostationary orbit. The difference is really noticeable, and I'd go so far as to say any latency is completely imperceptible.

However, the LEO orbit also causes problems. These satellites fly all over the sky: if you go to the wonderful website n2yo.com and click on the Globalstar link near the top, you'll see the satellites that are currently "visible" from your location; if you then click the "Draw footprint" checkbox at the bottom of the map, you'll see the circle of coverage for each satellite. Bear in mind, though, that the coverage tails off rapidly near the edges, and if you have obstructions such as hills, trees or buildings around you, then you'll get a signal only if you're near the centre of the satellite footprint.

As a result, I found the Globalstar phone's connection would come and go – unlike a geostationary satellite, where once you've found a signal, it stays locked. Indeed, in certain places I found it almost impossible to get a signal at all. My garden is large and has reasonably open sky all around it, but when I sat in the middle for a good half an hour I only received around two minutes of connectivity. In fact, I held on to the phone for far longer than I'd originally intended purely because I wanted to keep trying to see whether



< Waze is a great free navigation app that uses crowdsourcing to keep track of traffic

"Even with a clear sky, the Globalstar GSP-1700 often wouldn't connect"

I could get it to work reliably. I took it to various places around the country, but always found that the connection wouldn't stay up unless there was an almost uninterrupted view of the sky for 360 degrees. Even with a clear sky it often wouldn't connect, so in the end I gave up.

If you were trekking across a vast, open plain, this probably wouldn't be a problem, but I can't seriously recommend Globalstar for anywhere that has mountains, trees or buildings. If you need reliable communication, you'd be far better off using a provider with geostationary satellites, such as Inmarsat. Yes, there may be a short delay on the calls, and the cost might be a little higher, but at least you'd be able to talk for more than a couple of minutes without the signal cutting out.

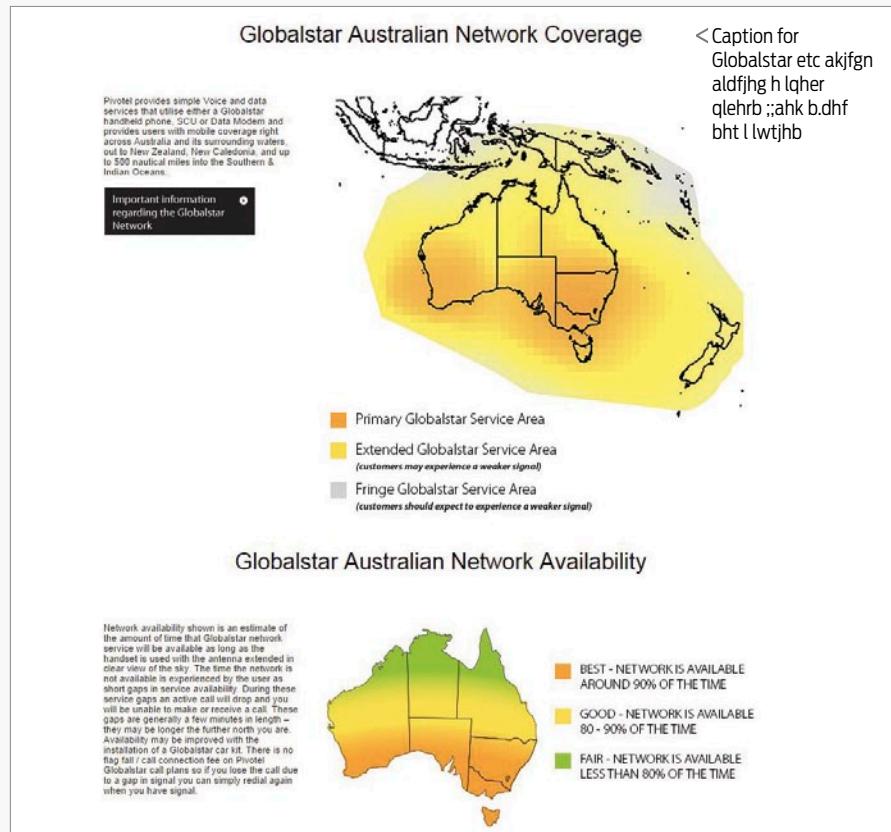
NAVIGATING THE APPS

Someone asked me the other day which is the best paid-for navigation app and I didn't even have to think about it – it's TomTom, hands down. Whether it's the best app overall, though, I'm not so sure, because I think the free navigation apps may have caught up at last.

A couple of years ago, all the free navigation apps were, frankly, rubbish. They'd work after a fashion to get you from A to B, but they'd often make it too hard to input your destination, choose terrible routes, and offer unclear driving instructions. They wouldn't know popular places of interest, either – you'd need to know the full postal address of, say, a National Trust house in order to plot a route there. As for route choices, some would be over-reliant on A roads, while others would send you down tiny country tracks. Spoken instructions were often crudely synthesised, eschewing road names and using American terminology such as "traffic circle" instead of "roundabout" and "on-ramp" instead of "slip road".

PEAK CRAP

While these free products were continuing their ascent to Peak Crap, the paid-for apps were getting better and better, adding extra features such as live traffic updates, speed camera locations and slick user interfaces. I've tried most of the free apps, but I always go back to TomTom, mainly because of the combination of its simple user interface and its above-average routing algorithms.



However, in the past year or so, the free apps have started to catch up. It started with Google Maps Navigation, although this has always been a difficult app to love, since every time you get used to the way it works Google changes everything. For example, it used to have a 3D view, then Google took it away, then a few months later it came back again. Little things like this can be frustrating.

But the app that really has people talking – and spending – is Waze. Google acquired it for US\$966 million last year, although the only benefit I've seen so far is Waze traffic reports – more on which in a moment – being shown within the actual Google app.

What makes Waze special is that much of its underlying traffic data is crowdsourced: the maps can be edited by anyone, and users' speeds and the routes they take – especially when these differ from the suggested route – are incorporated to improve its already excellent routing algorithm. Also, while driving, you can submit updates for events such as traffic jams and mobile speed cameras – and you can even do this without touching the screen, thus staying on the right side of the law.

There's a slightly gamified ambience to Waze that some users may find off-putting at first – you get "points" for driving, or submitting traffic reports, making map

edits and so on – but it doesn't get in the way. I haven't found a way to submit new road name pronunciations, which would be useful, since some of them may cause a bit of a giggle (there's one near me that sounds a bit rude).

The thing that any navigation product has to get right is guiding you to your destination quickly and efficiently, and that's something Waze does better than any other navigation product I've tried. It's far better than any other free product – and better than the paid-for ones, too.

THE WAZE HOME

On my 13km journey home from the office, Waze has sent me down shortcuts that I'd never discovered in ten years of driving this route, and the suggestions it makes always depend on combining typical traffic conditions for that time of day with real-time, crowdsourced information on traffic conditions from other Waze users. As a result, it rarely sends me on exactly the same route two days running, especially during rush hour, and it always seems to find a way to shave a few minutes off my journey. Even the ETA it offers at the start of a long journey is usually fairly accurate. As you can probably tell, I'm a bit of a fan, and the more people start using Waze, even for their regular journeys, the better it will get. ●

< Caption for Globalstar etc akifgn aldfjng h lqher qlehrb ;ahk b.dhf bht l lwtjhbj



"DESIGN AND CODING ARE FUNDAMENTAL TO APP CREATION, BUT THERE ARE ALSO LEGAL MATTERS TO CONSIDER"

Designing an app? Set clear legal terms from the outset of your project - you'll save yourself time, money and a lot of headaches in the long run

Last week, I saw a post from a friend on Facebook asking whether anyone could help her company to create an app. I replied right away, saying I'd be delighted to provide legal advice. "Thanks Liv, but we're really looking to build one," was the response. Okay, I'll admit that the design and coding are fundamental parts of the process, and likely to be the first thing on one's mind. But there are also legal matters to consider, and you can save yourself time and expense by building these into your plans from the outset.

Needless to say, this isn't always how

"When you start a project, the first thing to consider is intellectual property"

it happens. At night, I dream of a client coming to me at the outset of a project, asking: "What legal issues should I be considering right now, before I get in too deep, to guide the development of my project?" Then I'm awoken by a phone call. "My app launches tomorrow: will you draft a privacy notice for it? I've also agreed to share ownership of the code and data with our new business partner, so can we put something in writing to ping over to them that this afternoon?"

I received just such a phone call this month and, after a brief conversation, I sadly had to advise the client that it wouldn't be as quick and easy as they'd hoped. For a start, it emerged that the app had been developed by an external contractor. No contract was ever signed, but the code was delivered on time and my client was happy with the result. So,

no problem there, except for the fact that, in the absence of an assignment, the contractor probably still owns the copyright to the code. Rather than helping my client to share ownership with their business partner, I had to divulge that they may not actually own it themselves.

What about sharing the data? It technically isn't possible to own data, but I was able to suggest that if a consent feature could be built into the app, this could allow my client to share the data collected by the app with their business partner. Since the data being collected includes users' names, email addresses and location information, I mentioned that the privacy notice would need to clearly set why such information was needed and what would be done with it.

Following a few sighs, my client finished the call and went off to see whether the launch of the app could be postponed while the legalities were "fine-tuned". No doubt this was a blow to their plan, and one that could have been avoided if they'd been aware of the relevant issues earlier.

INTELLECTUAL PROPERTY

When you start an app project, one of the key matters to consider is intellectual property. This is likely to include rights to designs, brand, know-how, software and content, all of which require protection against being copied or misused by competitors. Some IP is best protected through registration: for example, registering your name and logo as a trademark is a very good way to protect a brand.

The actual code may be automatically protected by copyright. A common assumption is that if you pay someone to create code for you, the copyright must be yours – and for software created by your own employees, this is usually the case. Unfortunately, if you've engaged a contractor or other third party, the extent of ownership will depend on your agreement with them.

Complete ownership of the code isn't

the be-all and end-all, but make sure you have what you need for your business plan. If you plan to manage, maintain and adapt the app in the future, you'll need the source code, and the rights to copy and modify it. If you don't have ownership of the copyright, it may be enough to obtain an extensive (perhaps exclusive) licence that allows you to copy and modify the code, and to sublicense it to customers and business partners. Such a licence can then be transferred to purchasers of the business, as and when Google offers you US\$2 billion.

It's worth noting that the developer may not be able to assign all the copyright, since it may include third-party components, or proprietary modules that the developer needs to reuse for

▼ A clear privacy policy is not an optional extra

Privacy

Collection and use of your personal information

We use the personal information we collect from you to enable the features you use and provide the services or carry out the transactions you have requested or authorized. Some personal information you enter might be included in your Office files in the form of metadata. This metadata is used by Office programs to help you collaborate with others on your files.

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< A spot in the iTunes App Store comes with strings attached

services such as Facebook and Google Maps. So you're going to need to use a selection of SDKs and APIs, all of which invariably come with their own terms. App stores have rules – for example, your app may be removed if there are complaints about content or quality – but did you know that third-party platforms come with their own stipulations? Facebook, for example, requires your app to be able to handle permissions for user data, while if you use Google Maps within your app, your service must be free and publicly accessible.

Clients like to dismiss these issues as "standard stuff". While much of it is standard, it's important to know exactly who is taking responsibility for ensuring the rules are followed. If you're relying on the experience of an external developer, it would be wise to say so in the contract. Ultimately, do you really want to get into a dispute with a big name such as Apple?

You may also have arrangements with third parties to host content, manage users, contribute advertising, provide add-on services, conduct data analytics, purchase information and so on. And when dealing with business partners, don't over-promise: the client I mentioned above wasn't the first I'd seen who'd entered into an agreement to share data without checking whether it was actually lawful to do so.

A THING OF DREAMS?

Although the legal issues I've touched on are important, they only skim the surface. Depending on what your app does, you may also need to comply with consumer-protection laws, rules on in-app purchases, requirements for regulated services and many other matters.

The reality is that no matter how diligent you are, time, resources and other commercial demands probably won't allow you to perfectly itemise and sign off all potential legal issues before your app launches. The key, therefore, is to identify and address the most important concerns from the outset, and proceed with your eyes open to any remaining risks.

Right from the start of your project, alongside your design and coding, you should allocate time and budget to the legal issues. Remember, this isn't only about restricting what you can do: a strong legal foundation can assist with the success of the project, protect your intellectual property, facilitate your use of information and ultimately enhance the value of your app. ●

other customers. Clearly, if you're taking on outside expertise for your project, it's vital to specify in the contract exactly what you're buying – well before the work begins.

DATA PROTECTION

Many app projects are based (at least partly) on collecting and exploiting user data. The thinking behind this is that such information about users and how they interact with the app can help to improve the service, while also providing a means

"A short, hastily drafted privacy policy is likely to leave important issues unaddressed"

to more targeted marketing. The data itself may be saleable to business partners and other third parties, making it even more valuable. So why not?

To give providers credit, there is some awareness of data-protection requirements. A client may come to me and say "I need a privacy policy, so users can confirm their consent to our use of their data. A clickthrough will be fine: if they don't like it, they can always choose not to use the app."

This line of thinking isn't completely off the mark. It can be perfectly legitimate to collect data for analytics

and profile-based marketing, and even as a commercial justification for giving users the app for free. An unambiguous consent from users can also assist in satisfying data-protection and privacy requirements.

Unfortunately, it only goes so far. As I touched on last month, the fact that users have a choice over whether or not to use an app doesn't give you free rein with their data. And the user's agreement to a short, hastily drafted privacy policy won't necessarily constitute the consent you're looking for.

To address data-protection issues properly, it's necessary to take a much more detailed look at precisely what information will be collected, how and why it will be used, who will use it, where it will be stored or sent, how it will be kept secure and so forth. What you plan to do must be spelt out to the users, and specific consents may be required for activities such as profiling, marketing and data sharing. Clearly, these are best addressed during the design and development of the app.

Aside from compliance risks, it's also worth considering the perception of users. If people consider your activities too intrusive, they may simply choose not to use your app!

RELATIONSHIPS WITH OTHER PARTIES

If you're developing an app, you're likely to be running it on Android, iOS or Windows – or maybe even a combination of the three. You may also want it to interface with third-party

> The greatest app in the world must still comply with laws and regulations to protect you, and the users.





"THE YUBIKEY ISN'T CHEAP, BUT WHAT WOULD IT COST IF YOUR ACCOUNT WERE HACKED? IT'S WORTH EVERY PENNY"

The YubiKey Neo is a nifty piece of security hardware that offers a level of password protection even your bank is unlikely to match

If one of your online services offers two-factor authentication (2FA), it's a no-brainer to use it. I've covered most of the usual questions about 2FA before, so I won't go over them again, except to say that you don't normally need a mobile phone signal to secure yourself: authenticator apps are available that can generate codes without SMS. For services that do require SMS to generate a code, it's advisable to read the FAQs before switching on 2FA to see what alternatives you can use when SMS isn't available.

Two more questions – which I'm being asked with increasing frequency as more sites and services experience breaches of their own or third-party servers – are how to secure your login when 2FA isn't an option, and whether it's worth investing in hardware tokens, such as the YubiKey, to support your 2FA login. My answers are "Use 2FA anyway", and "Yes". Allow me to explain...

At the "prosumer" and small-business end of the IT spectrum, the login strategy most often implemented these days is a secure password-management system such as LastPass. The simple truth is that you're better off using such a service than not, as long as you understand that you still need to be password-construction savvy when generating passwords – and, of course, that you must remember your master password. While all of your service passwords may be complex, random and safely secured in an encrypted database, that's all for naught if your master password is too simple or written on a Post-it note stuck to your monitor.



DAVEY WINDER

Davey is an award-winning journalist and consultant specialising in privacy and security issues [@happygeek](https://twitter.com/happygeek)

This is why I advise you to use 2FA for every service – even those that don't support it – because LastPass Premium supports it.

You could use LastPass' option to employ Google Authenticator as your code generator, which is good enough, although not as good as a separate hardware generator. This is where YubiKey comes in. Reminiscent of a slim USB stick, the YubiKey Neo (www.yubico.com) provides the "something you have" part of the 2FA equation – something you know, plus something you have – and acts as a barrier

either NFC or USB, but the Apple camera connection kit or a Lightning-to-USB camera adapter will work fine according to Yubico (although I haven't tested my YubiKey with iOS).

The YubiKey may look a little flimsy, but don't be fooled – the key is remarkably durable, since its exposed elements are made from military-grade hardened gold and its internal circuits are encased in injection-moulded plastic. There's little chance of breaking it unless you try really hard using a power tool. There are no

moving parts and there's no internal battery to fail either.

How does it generate codes without a power source? Well, it has a built-in clock that draws power from either the USB port or NFC, and measures the elapsed time between two one-time passwords (OTPs). It also verifies user presence to block prerecorded OTPs from being used.

An OTP is a single-use password that becomes useless after one authentication transaction. Touching the YubiKey's



▲ A YubiKey Neo unlocks your services securely, at your desk or on the go

against compromise even if someone steals your password. At around \$120 including shipping from the US, or \$80 if you include a year's LastPass Premium subscription, the YubiKey isn't cheap, but what would it cost if your account were hacked? I reckon it's worth every penny.

What do you get for your money, and how does it work? The YubiKey is cross-platform and can be used with almost any device that recognises a USB keyboard, which is how it presents itself to the host computer. Thanks to its near-field communication (NFC) component, it can also be used with many smartphones and tablets that lack a USB port. iOS users may think they're out of luck, since they lack

button generates an OTP, which is a sequence of 32 modified hexadecimal (ModHex) characters. ModHex is similar to hex encoding, but it uses a different alphabet to get around the problem of different keyboard mappings (remember that the YubiKey looks like a USB keyboard). You don't need to know much about this, only that the result is layout-independent encoding.

The 44-character sequence generated – 32 for the OTP and 12 for the token ID – is encrypted with a 128-bit AES-128 key. The information it contains includes the private identity of the YubiKey; a count of how often it has been used; the time intervals between successive OTP generations; a random number added to the encryption; and a closing CRC-16 checksum for all these fields. As such, YubiKey renders

spoofing impossible, since the counter value means the validation server knows which OTPs have already been used.

Of course, if an attacker manages to get their hands on your computer, your password and your YubiKey all at once, you're stuffed: only a biometric 2FA method such as fingerprint recognition could work in that dire scenario. The 2FA token my bank provides, a standard LCD model, is limited to a truncated eight-digit passcode – rather weak compared to the YubiKey. Its reasoning is a trade-off between security and usability, namely the length of code that any user can be expected to copy from such a small screen. The YubiKey isn't subject to such a limitation, since you never have to type its codes. This permits longer codes that are magnitudes more secure.

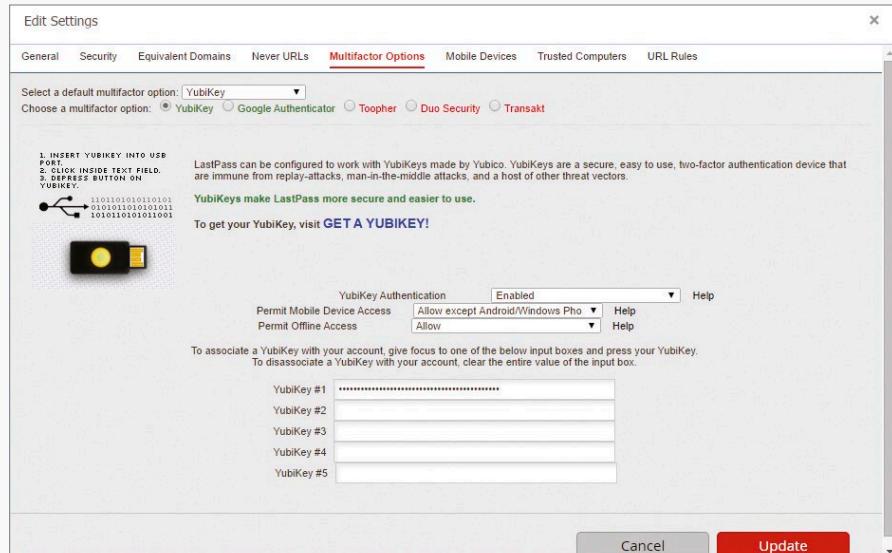
The YubiKey comes with two slots; a short press activates the OTP from slot number one and a longer press activates slot two. The first comes preprogrammed with a YubiCloud credential that lets the YubiKey work out of the box with, for example, LastPass, while the second slot is free for adding another credential (a cross-platform personalisation tool can be downloaded for free from Yubico to enable such programming).

You can use the spare slot for many things, including a complex static password if you happen to prefer a password manager that isn't LastPass. Don't use all 64 available characters for your password, though: be a little more clever. Instead, use these as part of your password and let YubiKey generate a random code – via a ten-second button press followed by a single press – that's more secure than one you'll think up yourself.

Bear in mind that you can't back up a YubiKey, so you'd be stuck if you lost it. However, this doesn't usually affect hardware 2FA scenarios, since most online services offer secure alternative methods that allow you to access your account in case of such a loss.

Anyway, here's my static password usage plan: split your complex password into an easy-to-recall, short string such as "Poetic666" and a more complex and random section such as "saiudefsiefw9783469tgeqdF!". When programming your second YubiKey slot, enter only the complex part, "saiudefsiefw9783469tgeqdF!" – this will become your static password. To log in to your account, you'll only have to enter manually your username and the first part of your password, "Poetic666", and then press the YubiKey.

As far as mobile use with LastPass is concerned, I prefer the YubiKey to Google Authenticator, for a couple of reasons.



▲ Enabling your YubiKey for LastPass use is easy once you've upgraded to a Premium subscription

It's as much to do with convenience as security, to be honest: I use a YubiKey on my laptop, so it makes sense to use it on my phone as well, and I save time by not having to fire up the Google Authenticator app and type the code across – I just wave the key (which I carry on my key ring) at the back of my tablet, ensuring my finger is on

remember that you need the Premium subscription to the password manager, rather than the free version. It only costs US\$12 per year, though, so it isn't going to break the bank.

In a desktop browser, go to the Settings page in LastPass and head for the Multifactor Options screen; here, select the YubiKey radio button. Next, insert your YubiKey into your computer and give focus to one of the YubiKey input boxes on screen, pressing the

YubiKey button to associate it with your LastPass account.

That's it – unless you want to use your YubiKey with a mobile device as well, in which case you'll need to ensure that the Permit Mobile Device Access box is set to "Allow except Android/Windows Phone". All the documentation told me to set this to Disallow, but this didn't work for me. Your mileage may vary, but if one doesn't work, the other should.

HAVE YOU BEEN PWNED?

Many readers have been emailing me recently for advice regarding the latest Gmail hack. A list of millions of usernames and passwords, supposedly Gmail logins, was posted to a Russian site. In fact, the list seems to be a composite of ancient compromised databases and a few newer ones. What's more, the logins aren't from Gmail at all, but from other sites and services where a Gmail address was used to register the account. Sure, there'll be overlap – some of the listed logins will have been reused on Gmail, and some may even still be active, but only a few. Besides, anyone indulging in password reuse has probably been compromised already, whether they know it or not.

"Bear in mind that you can't back up a YubiKey, so you'd be stuck if you lost it"

the button.

Also, Google Authenticator must be installed on your device, whereas the YubiKey is a separate item. Call me paranoid if you like, but I'm happier knowing that if someone managed to steal my phone or my laptop, they wouldn't be able to use them to access any of my 2FA-protected services.

And if you're worried about someone activating your YubiKey via an NFC reader, don't be. Tests using a high-powered reader proved unable to activate or read the YubiKey NFC from any further than two inches. If an attacker was that close, you'd probably notice, especially as my own tests required the key to be placed directly onto the far less powerful NFC reader in my Nexus 7 tablet.

The biggest security problem, even when a YubiKey is in use, is accessing a secure service of any kind from a handset that's already compromised. Don't think that using OTPs and 2FA makes you immune from attack: it doesn't, it's only one more layer in your security strategy, which should also include pertinent device usage and anti-malware protection.

Setting up a YubiKey to work with LastPass is simple enough, but



“Anyone indulging in password reuse has probably been compromised already”

Since we're on a LastPass theme this month, why not use its security audit to see whether you are guilty of any such reuse yourself? If you are, change your password for those sites and while you are at it take heed and learn from the lesson, and go ahead and also activate 2FA on your Google account.

Finally, if you're concerned that your email address – any email address, not only a Gmail one – may have been bandied about on a list of compromised logins, head over to Have I Been Pwned? (haveibeenpwned.com), which will check and report back to you. Before you ask, you can trust it not to steal stuff from you; I wouldn't recommend it otherwise.

HEO EXPLAINED

Everyone knows what a hashtag is these days – the word has even made it into the Oxford English Dictionary (OED), thanks to widespread Twitter use. Hashtags are no longer restricted to tweets, either: Facebook has been using them for some time, and they will also be familiar to Google+, Instagram and Pinterest users.

However, as a small business, have you thought about their marketing potential? If you've already created a social media presence for your business, you'd be pretty daft not to – you could be missing one hell of a free advertising opportunity.

Going back to the OED, a hashtag is defined as something that “identifies content related to a particular topic”. If that doesn't get the marketing metadata bells ringing, nothing will.

This is where sensible hashtag use enters the picture, enabling the public to find you and your stuff whenever they search for a specific keyword in hashtag form on any given service. That's the key: think of hashtags as metadata keywords and use them in the same way you would to drive traffic to your website using traditional search-engine optimisation (SEO).

Hashtag-engine optimisation (HEO) is perhaps less obvious, but can be just as effective. Here's how. First, you'll need to make sure that everything you post is hashtagged appropriately – that's the obvious part.

Next, you need to get proactive: start keeping an eye on trending hashtags across the social media you use; identify anything that's related, even obliquely, to your business or product and create content around it. ●

The screenshot shows the Microsoft Office 365 "Buy Office 365" page. At the top, there are links for "HOME", "PRODUCTS", "SUPPORT", "TEMPLATES", "STORE", and "OFFICE ONLINE". A "See options for business" button is also present. The main heading is "Buy Office 365", with a sub-headline: "Office 365 gives you the power and flexibility to get things done from virtually anywhere". Below this are three bullet points: "Full installed Office applications", "Access documents from your favorite devices", and "Extra online storage, monthly Skype world minutes, and more premium subscription services".

Office 365 Home	Office 365 Personal
Office for households \$12.00 per month SAVE 17% with an annual subscription BUY for \$119.00	Office for you \$9.00 per month SAVE 17% with an annual subscription BUY for \$89.00
Buy and activate Office 365 and receive \$25 cash back* Learn more	Buy and activate Office 365 and receive \$25 cash back* Learn more
Learn more	Learn more

Below the plans, there are two sections: "Choose the Office 365 plan that works for you" and "Compatible with Windows 7 or later, and Mac OS X 10.6 or later". There are also icons indicating compatibility with "5 PCs or Macs" and "1 PC or Mac".

MICROSOFT GETS IT – ALMOST

It can be hard to make a dispassionate decision when it comes to email. The insidious, subterranean way that large lumps of data accumulate inside this humble repository is powerful and influential, made more so by the industry's tendency to promote shiny, new things rather than develop old, boring things. Office 365 is most certainly a nice, shiny, new thing, but that doesn't justify proclaiming it a universal cure-all. Hybrid Exchange is a far more fully thought-out solution, since it

allows a business to fine-tune the risks that lead so rapidly to the office of my purple-faced CEO.

For instance, if you have

many gigabytes of historical mail in a large swathe of public folders, there's nothing inherent in the modern Exchange environment to stop you keeping this on a local server. The machine needn't do any more than host the mailboxes; all the “edge transport” roles for receiving and sending, spam security and mobile device sync can be kept in the Azure cloud. Your cloud-based Exchange server needn't be very large (keeping fees down), nor store much history (after all, this is now local). The site

link features in Windows Server 2012 R2 keep this architecture separate from the physical internet links or the service provider you're using (so you can have several). All in all, this makes for a phenomenally high-performance, fault-tolerant email system.

Yet if you talk to a Microsoft reseller, or to Redmond's own sales teams, all you'll hear about is Office 365. No matter the quality of your internet connection, or the volumes of data you have to keep within an email repository in the long term, Office 365 can

do the job. Except, of course, when it can't.

To my mind, Microsoft has the right solution, since it has more than one solution.

However, it isn't making it clear when one option is weaker and the other stronger, since the temptation of high Office 365 fees overrides common sense in the mind of a sales adviser. This is a problem that proved so challenging for Michael Dell, when he was looking at the future of his company, that he had to buy the whole thing back from its shareholders to shake out such shallow revenue motivation and do what the customers needed. Will Microsoft find this kind of courage? ●



PUBLIC SPEAKING

For many of us, this can be a challenge at best, an impediment to career advancement at worst.

Fiona Teakle stands up with some brilliant advice.

When we think about public speaking, we think about standing in front of a crowd of people trying to get a point across and for most people this can be a pretty frightening thing. However another aspect of this that people struggle with is the idea of talking in a meeting. For people who may be less confident or experienced it can be a challenge to step in and put your point forward. I was recently reading Lean In by Sheryl Sandberg and she talks about "sitting at the table", in which she talks about how women need to ensure they are part of the meeting and not just sitting in the background. While it does relate to women, I also think it relates to a lot of younger people who may be new to the workforce.

While standing in a crowd of people and talking is slightly different to sitting in a room of 5-10 people and talking, there are plenty of things aligned, that if you master, will make you more confident in both situations.

Some tips to ensure you put your best self forward are:

- Know your material: common sense, but getting up on stage or sitting in a meeting and fumbling your way through pretending to know what you're talking about is not a good look and majority of the time people will know that you aren't being authentic.

- Know the audience: in both scenarios this will make giving a presentation or leading a meeting discussion easier if you know the people you are talking to. You are able to then relax and ensure you are presenting what you need to in order to get your message across rather than focusing on what people may be thinking of you. If they know you they are going to want you to succeed, people don't want to see someone fail,



"Help your audience avoid "death by PowerPoint" and prepare slides with interesting images"

- Over confident: while being confident and believing in yourself is good, if you are over confident it can come across as arrogant, which will get people off side. Understand your boundaries so that you can be yourself and know people will like you.

- Acknowledge mistakes: acknowledging when you make a mistake and being polite about it is essential, however if you go too far overboard it can work against you. Apologising too much will not help, recover quickly and smoothly transition back into the important points that you've come to make, most likely nobody will even remember your little mistake!

AJ also said that his tip for things you shouldn't do is "treat slides like notes i.e. don't read off them! Slides are used to add visual elements that enhance your message not to remind you of what to say next. Help your audience avoid "death by PowerPoint" and prepare slides with interesting images."

While this has discussed some of the tips to try and help you deliver a better presentation or be more prepared for a meeting, if you aren't sure you are there I encourage you to do some research and learn more. However the one thing I would also suggest is that you ask for feedback. Gaining open and honest feedback from people you trust will only help you grow.

In most states the ACS runs a toastmasters club which I encourage you to join or at least try out if you feel that this is an area that you would gain some benefit from growing in. Head to the website www.acs.org.au to find out more about this!



FIONA TEAKLE

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SHINY PRODUCTS AREN'T ENOUGH, SAYS JON HONEYBALL, AS HE TELLS SAMSUNG TO COME OUT FIGHTING

“The news of Samsung's significant collapse in profits is somewhat alarming for the consumer electronics industry. When such a powerhouse runs aground, warnings are writ large for other big companies too.

It should be remembered that Samsung is an unusual manufacturer, because of the enormous breadth and depth of the products it makes. From big TVs and computers to fridges and washing machines, there's almost no area of the market from which it's absent. And that's only consumer products: now also look at Samsung's reach and importance in the chip and components marketplace. It truly is the case that it can – and does – make almost all of the components that go into its many devices.

Compare and contrast this with Apple, which doesn't actually make any of its own products, relying on third-party companies to do the assembly. The requisite parts are acquired from many suppliers, and often multiple-sourced.

So the drop in Samsung's profits needs an explanation. Much of the fall is due to the company's costly, high-end smartphones not selling that well. There's a natural curve to this, of course. The average Android phone is much better than it used to be: the hardware is excellent, with superb screen technology and strong battery life. There's little reason to upgrade to the latest shiny device every year.

In addition, it's become increasingly obvious that Apple has succeeded in grabbing the high-price, high-margin market across smartphones, tablets and laptops. If you follow the money, almost all of it ends up in Apple's GDP-sized bank account. Samsung has been fighting hard

for a share, with eye-watering levels of global marketing spend, but with limited relative return.

Other figures released recently show that Samsung is also paying out huge sums to Microsoft in the form of patent-licensing money for the Android OS – one billion dollars. You'd think that a billion a year to Microsoft would be a sufficient incentive for Samsung to drive development of its own patent-free platform – but there's precious little evidence that the work on Tizen OS is going anywhere.

What Samsung needs to understand is that we're at the end of an era. An era that saw connected devices use the internet to offer content and services to users. The cloud has played an important role in the latter part, of course, but the amount of true sharing going on between devices has actually been fragmented and limited.

The new era will be one of seamless interconnectedness of all your devices. It has been cutely termed IoT, or Internet of Things, as if we haven't had things connected to the internet before now. It will be a move from the term "cloud" representing "my data" to meaning "my devices" too. Some of this IoT won't even involve the cloud as we know it: the rise of the Bluetooth-connected smartwatch could mean data is sent directly from your phone to your watch, bypassing the cloud altogether. Sensitive data, such as health, may fall into the category of information that you very much want to keep well away from the cloud.

This new era of truly interconnected devices is exactly where Samsung should and could shine. Given its reach into all markets, it should be the default that every device you own automatically finds and integrates with every other device. It's

“The old-fashioned islands of individual devices is the past. I should be able to have a baby-cam appear in the corner of my smart TV”

madness that my Samsung smartphone isn't aware of my Samsung TV. Or that my microwave doesn't automatically, and unprompted, pop up a "cooking done" message on my smart TV.

There's a wealth of useful connectedness that should happen transparently, ultimately driven by open standards. But in the meantime, the salvation for Samsung's financial woes should come from customers saying: "I need a new fridge – and I will look at a Samsung fridge first because I know it will work with my TV and phone."

I can see a huge range of possibilities for making things better for customers in useful and interesting ways here, and the old-fashioned islands of individual devices is the past, not the future. I should be able to have a baby-cam appear in the corner of my smart TV. I should be able to move a videoconference call from my TV to my smartphone, then walk into another room and push it onto a device in there.

To make this work will require a huge engineering effort focused on making devices actually talk to each other. Apple does this well in how OS X integrates with iOS, but the company's reach is limited to a small range of product areas. Samsung has a vastly bigger reach. It's time the company made use of this advantage.



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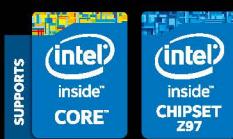
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